- Sulfite liquor recovery system
- Cellulose adhesives
- New experimental coater
- Multiwall bag manufacture
- Cellulose conference at Syracuse

TECHNOLOGY DEPARTMENT

The Paper Industry

Publishers of PAPER AND PULP MILL CATALOGUE

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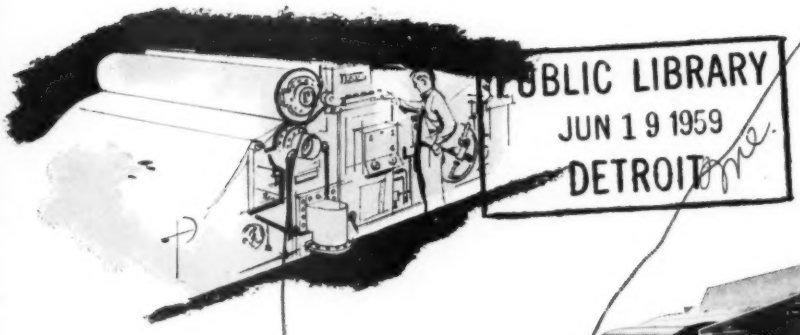

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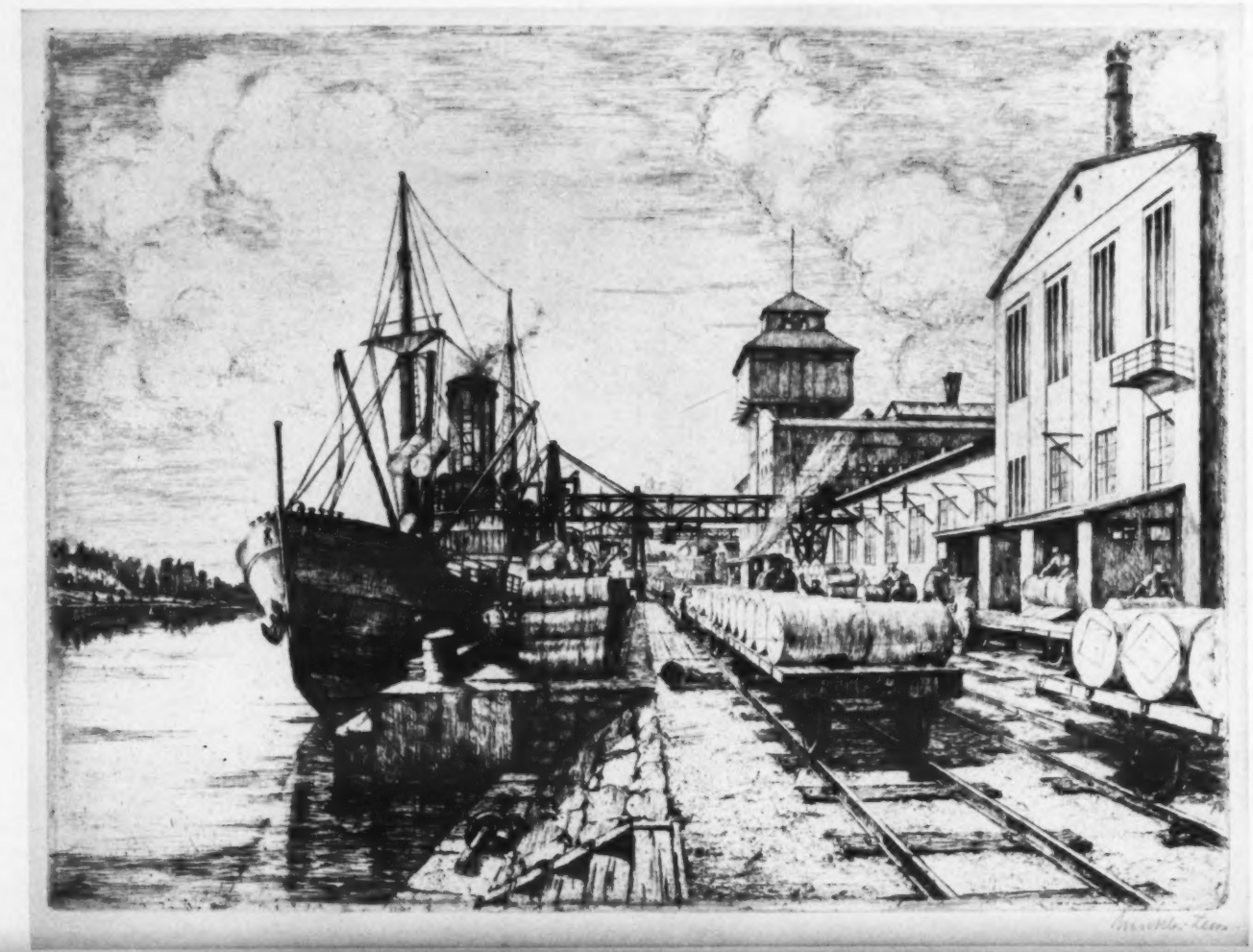

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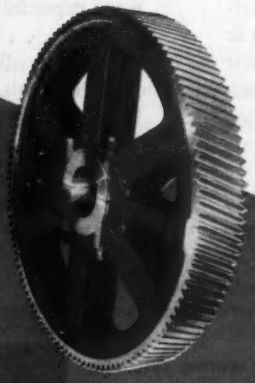

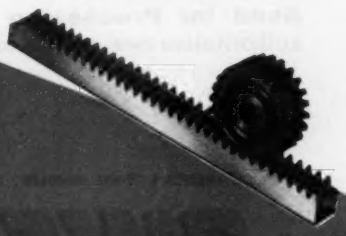

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VOLUME 41 **NUMBER 3** **JUNE 1959**

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W. P. "Sandy" Wehking, the Standard Oil man who calls on Hunter Packing Company, has plenty of experience in technical service work. He's been at it for 17 years. Sandy studied chemistry at Blackburn College. He has also completed the Standard Oil Sales Engineering School.

To get more information about STANOIL Industrial Oil and to obtain technical help on your lubrication problems, call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write, **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
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- Antioxidant gives oil resistance to chemical change, minimizes deposits.
- Inhibitor "plates out" on metal surfaces, prevents corrosion.
- Receives special refining to eliminate emulsion problems. Contains additive to minimize foaming.
- High viscosity index. Resists temperature change.

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Temperature check. Frank Peterson of Hunter Packing Company and Standard Oil lubrication specialist W. P. "Sandy" Wehking inspect one of four compressors in Hunter plant that uses STANOIL Industrial Oil.

From our point of view..

10th Coating Conference stresses need for new concepts of coating

With all due credit to the TAPPI Program Committee, the striking success of the 10th Coating Conference held at Boston on May 25-27 must be attributed in large measure to a growing realization that coating — especially quality coating of paper and board — has become an indispensible operation in the paper mills and that more information on coating methods and coating problems may well determine the profits picture of the individual mill.

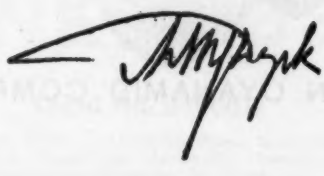
Judging by recent installations of paper coaters, no coater is currently enjoying a popularity as great as that of the trailing blade coater which has the ability of imparting to paper an extremely smooth coated surface and at high machine speed. However, even the trailing blade coater, with all of its advantages, is not meeting all the requirements of paper coating and it is increasingly being recognized that probably a combination of coating methods, e.g. trailing blade and roll coater or trailing blade and air-knife, may be the answer to better quality coating.

An entirely new concept of coating was described by J. R. Gunning, Abitibi Power & Paper Co. This coater, known as the Kohler coater, has no moving parts and coats the paper by direct contact with coating colors in a pond (see back page in this issue). The special advantages of this coater are its simplicity of installation and the apparent absence of any speed limitations. Should the claims made for the Kohler coater be generally substantiated, there is no doubt that this coater will rapidly gain acceptance throughout the industry.

In recent years there has been a tremendous increase in coated board production. Its rapid rise has come as a surprise and found the industry quite unprepared in meeting the sudden demand for this product with specially designed equipment for coating board. As a result, conventional paper coating equipment is now being used on paper board manufacturing machines.

The special characteristics of board and the special requirements dictated by its end uses, will undoubtedly give rise in the near future to new coater designs and new coating formulations specially suited for the coating of board.

The time is undoubtedly ripe for radically new coating concepts, coater designs and for heavy capital expenditures needed for their development. In this connection the industry should follow Mr. H. M. Annis' advice and keep an open mind to all coating methods and design developments.



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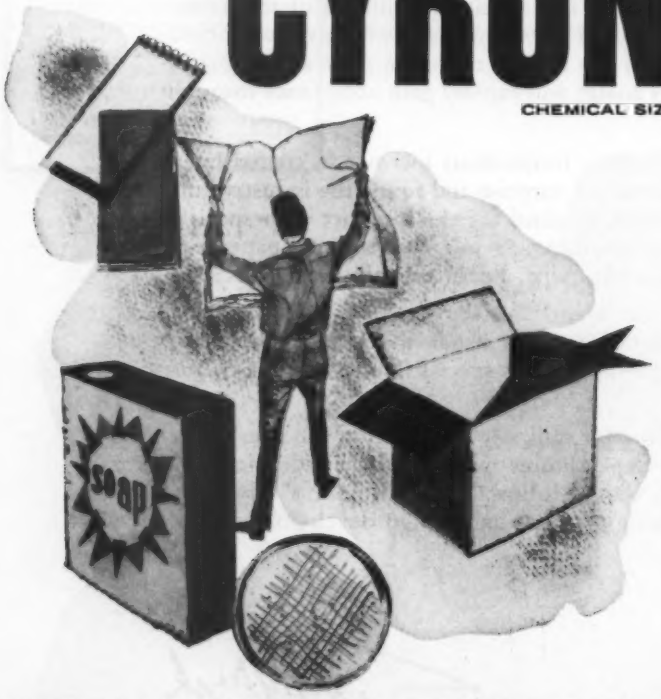

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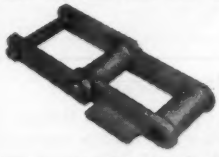
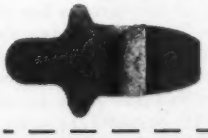
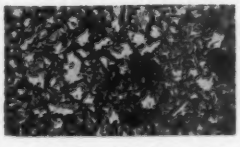
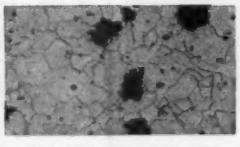


Many center link and sidebar attachments are available to suit a variety of conveyor applications. WS attachment is shown above.



File-hard surfaces of Flint-Rim sprockets help maintain efficient, dependable performance of chain and sprockets . . . prolong chain life.





Promal or file-hard Promal chain can be furnished for unusually abrasive conditions. Dark areas in Promal structures (left) show stronger, stiffer reinforcing material. Malleable (right) shows white "free-iron," black is soft carbon nodules.

Broad sliding surfaces of Link-Belt C-132 chain hold up longer on drag conveyors

Yes, with its broad top and bottom surfaces, Link-Belt C-132 chain is particularly resistant to the sliding wear encountered on carrying and return runs of drag conveyors. This high durability pays off in low maintenance, minimum shutdowns.

C-132 chain combines cast center links with steel sidebars connected by steel pins — offers ample, live joint bearing area to withstand pulpwood punishment. For further facts, contact your nearest Link-Belt office or authorized stock-carrying distributor, listed under CHAINS in the yellow pages of your phone directory. Or write for new Catalog 1050.

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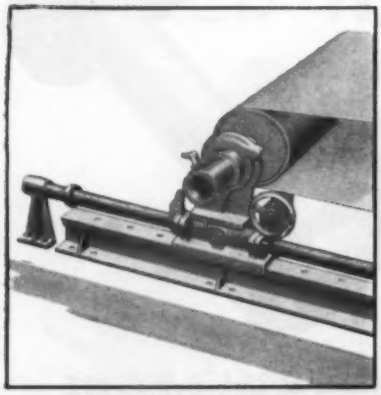
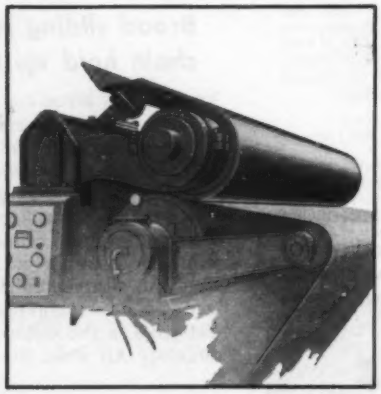


Felt stretch under positive control?

Heavy-duty Beloit felt-stretchers combined with felt tension indicators provide positive control of felt tension and stretch. Optimum felt stretch can be maintained from shift to shift, day to day. Felt life and drainage can be increased—felt guiding is more positive. Seam-straighteners are an integral part of Beloit felt-stretchers. Air motor operators are available for both stretchers and seam-straighteners.

Press crowns a problem?

If so, consider stiffened, rugged Beloit press rolls. Bolted heads coupled with Beloit heavy-wall design result in uniform deflection as opposed to press rolls with cast heads. Heavy-duty antifriction bearings are protected from loss of lubricant or entrance of moisture. Call on Beloit for grey iron, ductile iron, or granite press rolls for dependable service at press, size press, breaker, or wringer roll positions.



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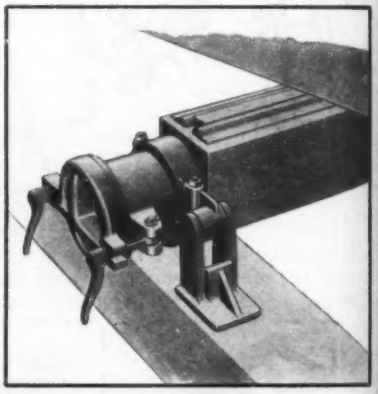

Felts filling up?

Many mills have found Beloit felt suction boxes a profitable answer to longer felt life and improved sheet quality. A Beloit felt suction box and shower arrangement provides full-width continuous cleaning—keeps felts clean and open. An adjustable slot width supplies just the right amount of vacuum for the specific application. A low-cost addition that can keep felts cleaner—longer.

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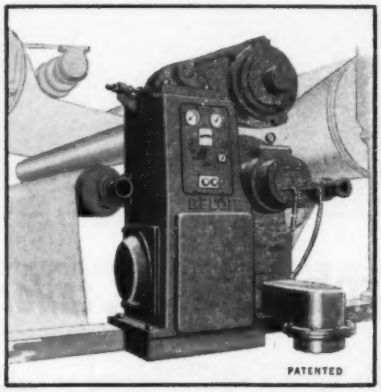

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Heavyweight sheets a problem?

The Beloit hot press is doing a fine job on machines running heavyweight grades. The hot press dewaters the sheet after it has been raised in temperature, resulting in greater water removal and a dryer sheet to the main dryer section. The Beloit hot press arrangement may be employed as a plain hot press or a suction hot press depending upon your requirements. When used as a suction press, the hot press employs the unique Beloit air-bleed principle.

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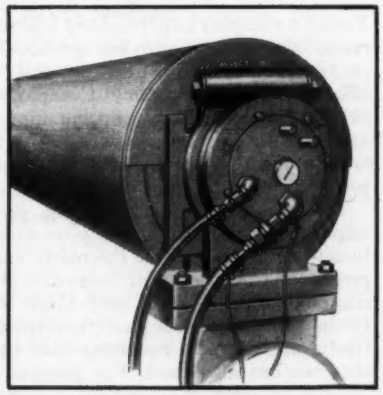

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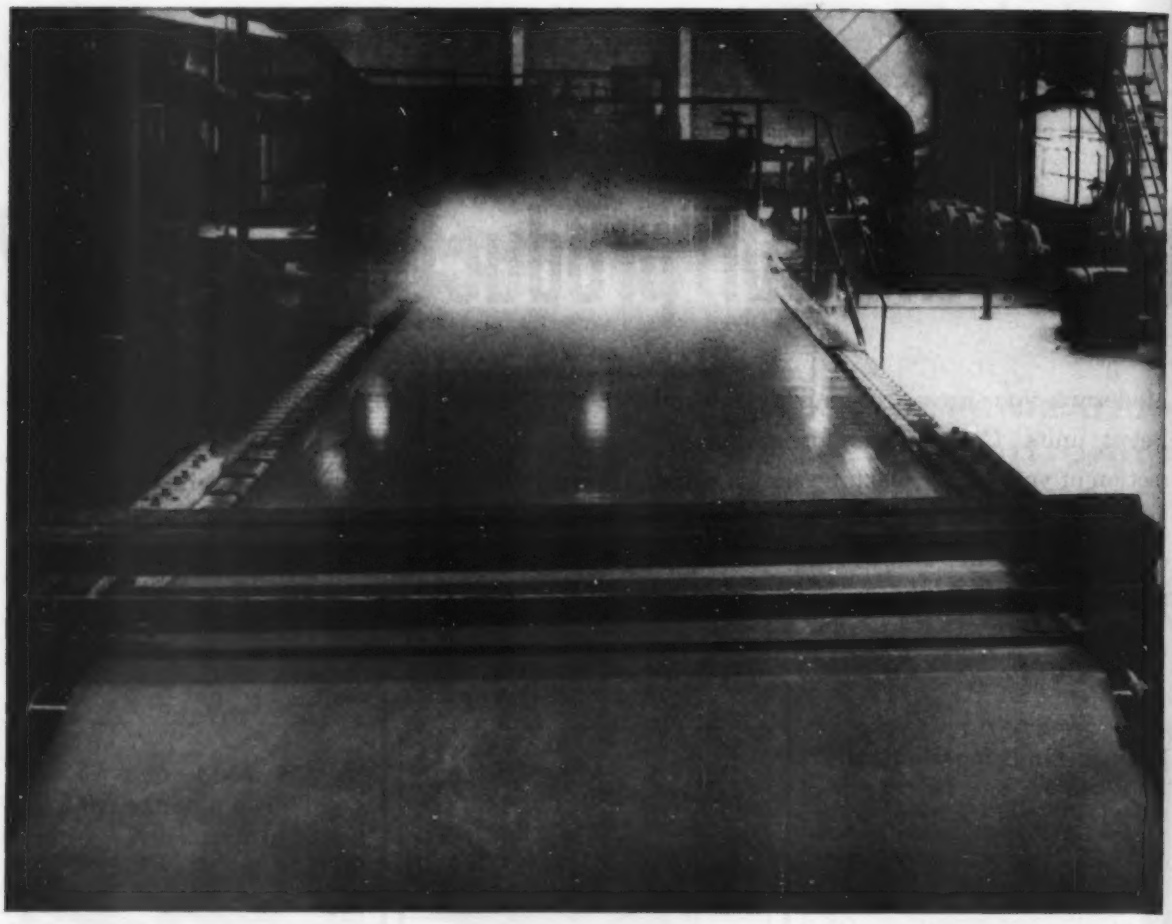

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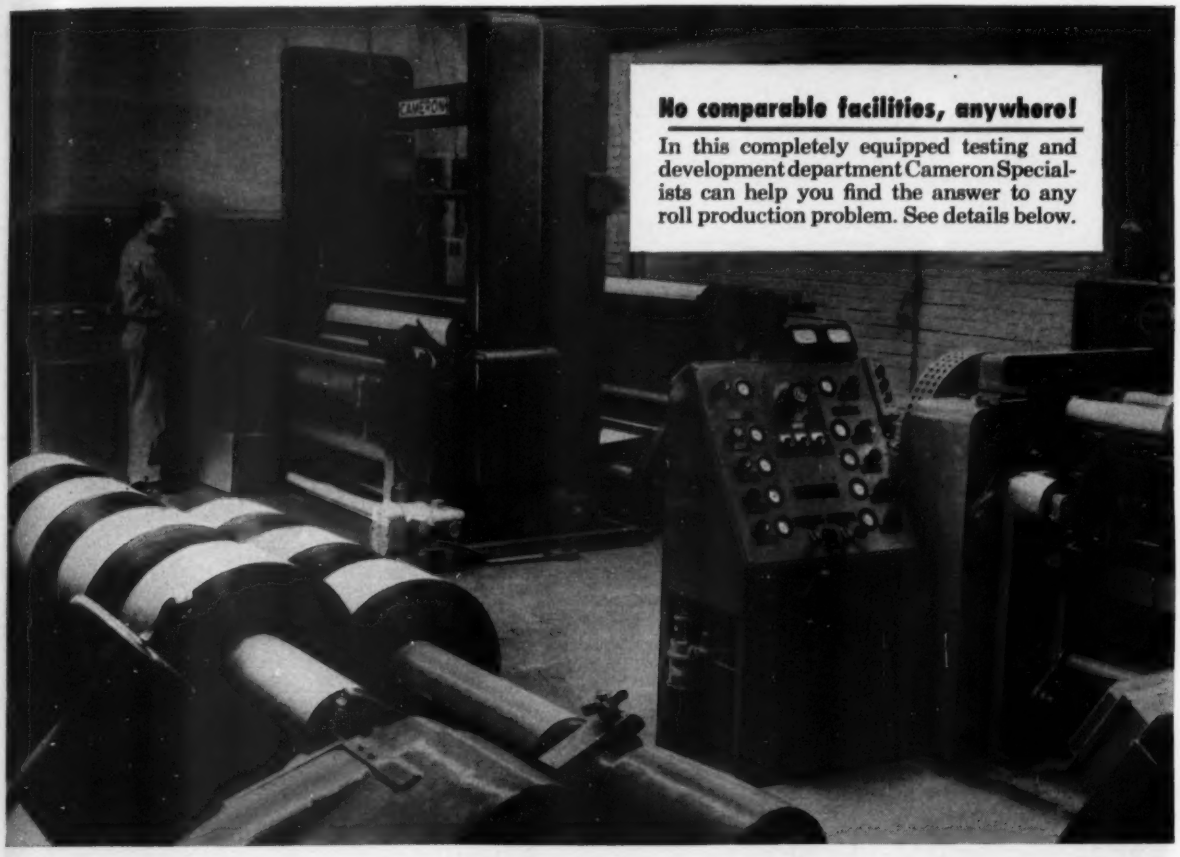

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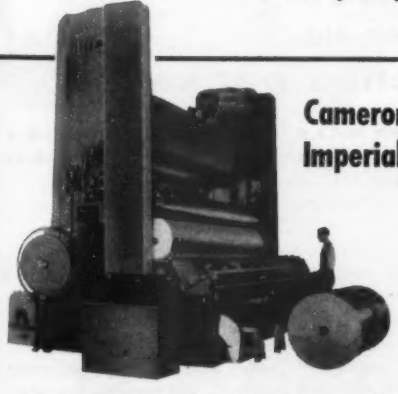

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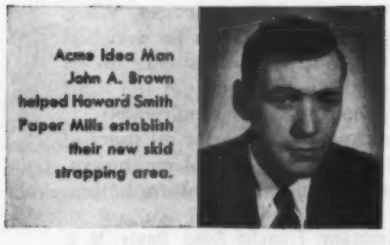

Acme Idea Man John A. Brown helped Howard Smith Paper Mills establish their new skid strapping area.

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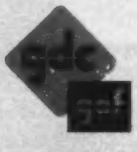

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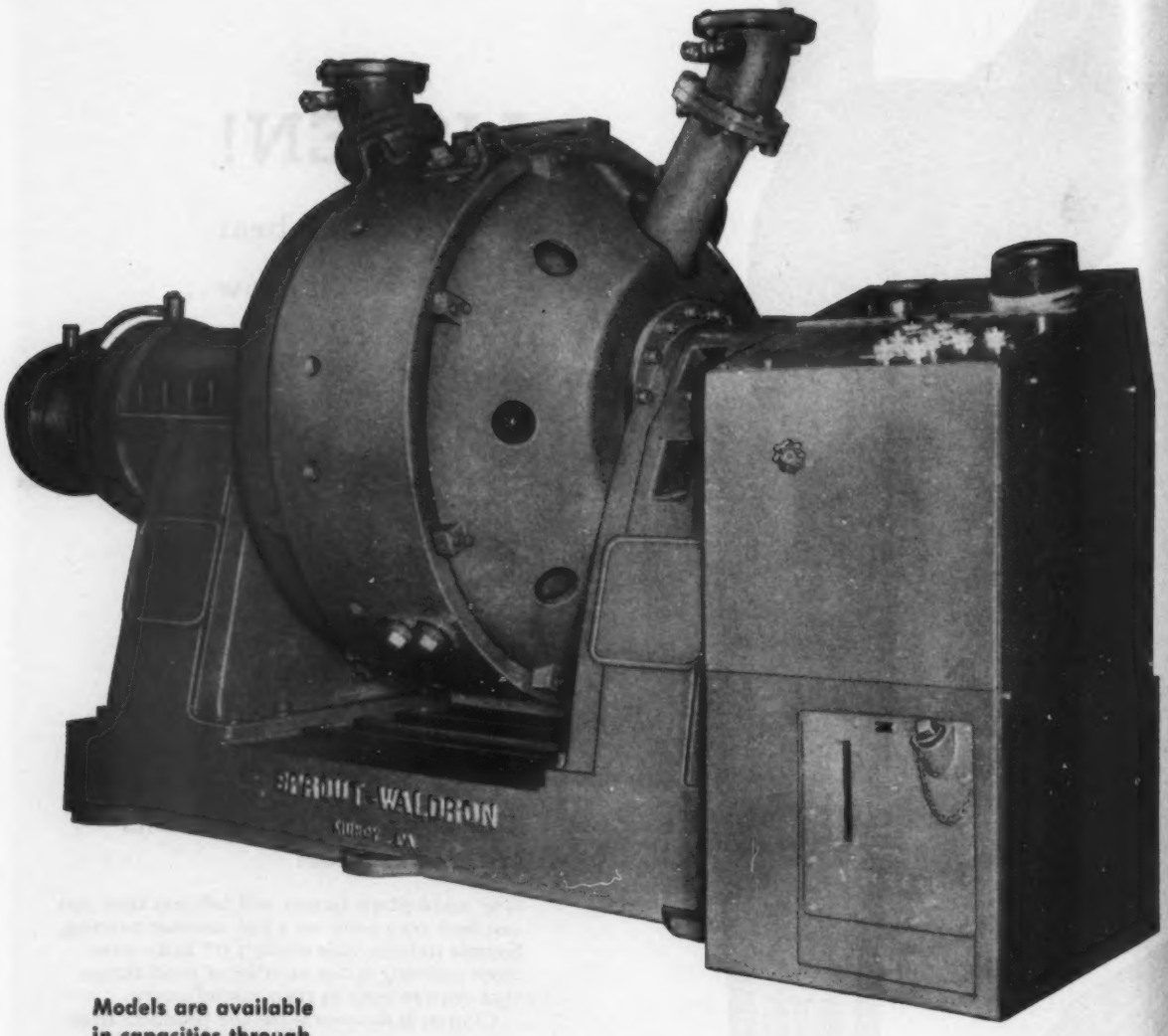

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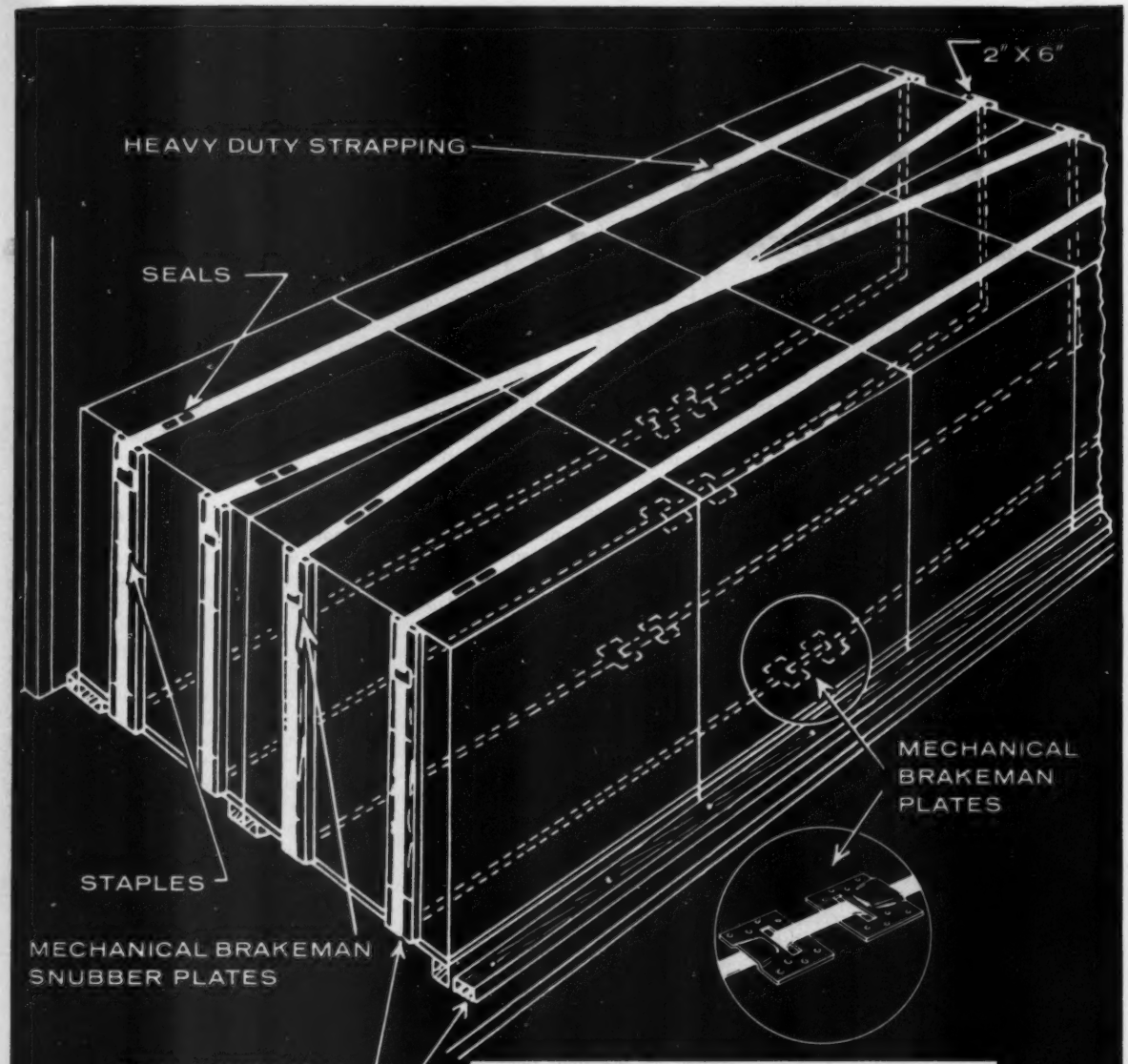

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W-P recovery system in operation at Consolidated Water Power & Paper Co.

A. W. J. DYCK

THE NEW soda ash recovery system — now operating successfully on a commercial scale at Wisconsin Rapids Division of Consolidated Water Power & Paper Co. — has brought soda base sulfite pulping within the range of economic operations. Sulfite mills using this system will now be able to compete with the kraft pulping processes both in respect to cost and pulp quality.

The basic process — developed by R. Q. Boyer of Western Precipitation Corp. — involves the conversion of sulfides and sulfites to the non-corrosive thiosulfates in an oxidizer. This non-corrosive liquor is then concentrated in standard evaporators made of mild steel and burnt in the recovery furnace — in accordance with the standard kraft recovery system.

Among the advantages claimed for the new system are: (1) an inexpensive sulfite evaporator system; (2) efficient chemical and heat recovery; (3) direct production of sulfite cooking liquor which is free of thiosulfates and hydrogen sulfide; (4) the system can be integrated with NSSC or kraft recovery systems; and (5) production of strong, light-colored, easy-bleaching pulps from a wide variety of woods.

The recovery process

The recovery process is illustrated diagramatically in the flow-chart. Spent sodium base sulfite liquor is mixed with recovered sodium sulfide and sodium carbonate and fed into a thickener. By controlling the ratio of sodium carbonate to sodium sulfide, the liquor in the thickener is held to a pH 11.8. Any calcium present precipitates out as $CaCO_3$ and is removed in the thickener together with any fine pulp fibers that may be present.

The alkaline, calcium-free liquor is then fed to an air oxidizer, equipped with No. 60 carbocel diffuser plates, where it is blown into a foam for easy oxidation. The oxidation reduction reactions taking place in the oxidizer are illustrated by the following equations:

$$S^{=} + O_2 + H_2O \longrightarrow S_o + 2\ OH^{-} \quad (1)$$

$$S_o + SO_3^{=} \longrightarrow S_2O_3^{=} \quad (2)$$

Reaction (1) goes to completion leaving only about 1 ppm of sulfide ion. The zero valence sulfur then react with sulfite ions to form the non-corrosive thiosulfate ion. The liquor at this point has a pH of 10.7 and is of high enough alkalinity to prevent precipitation of the desulfonated lignins.

The oxidized liquor is fed to a two-effect evaporator where it is concentrated to 45 per cent solids. At this concentration there is no danger of any lignin products being precipitated during prolonged storage. The concentrated (45 per cent) liquor is then stored at elevated temperatures to await the final concentration stage.

From storage, the 45 per cent liquor, together with added sodium sulfate recovered in the multi-clone, is fed to a forced circulation finish evaporator where it is concentrated to 65 per cent solids. The forced circulation evaporator is necessary to prevent precipitation of hydroxy-lignins due to the presence of sulfur dioxide gases.

The 65 per cent liquor is sprayed at the rate of 8 gpm into a recovery furnace equipped with an economizer and air heater so that the flue gases (containing about 1 per cent sulfur dioxide) leave the unit at a temperature of 300° F. The recovery furnace, which can operate entirely on concentrated liquor fuel, has a daily capacity of 75,000 lb. of steam.

The hot flue gases pass first through a Multi-clone (an electrostatic precipitator is planned for a larger installation) where sodium sulfate is recovered which is then fed to the concentrated liquor system, ahead of the forced circulation evaporator. The sulfur dioxide laden flue gases then continue through a Johnstone tower, where the SO_2 is absorbed in a spray of sodium sulfite-sodium bisulfite scrubbing liquor. The sulfur dioxide enriched solution from the Johnstone tower is fortified in the auxiliary acid-absorption tower with make-up SO_2 from the sulfur burners. The resulting sodium bisulfite solution is either reacted with soda ash solution to form NSSC cooking liquor or is pumped to the acid sulfite mill.

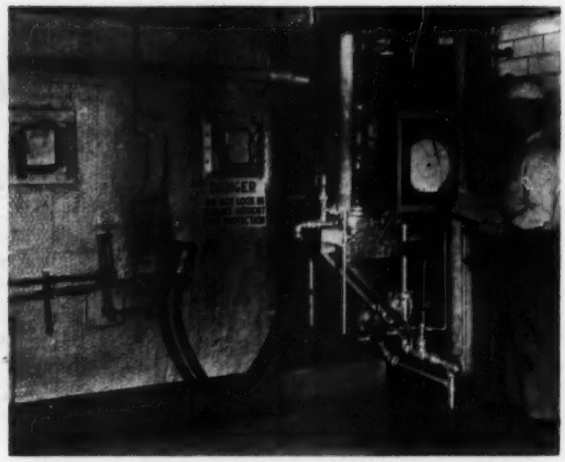
Smelt from the recovery furnace, with equimolar contents of sodium carbonate and sodium sulfide, is dissolved in a dissolving tank to form a nearly saturated, 1.2 sp. g. solution. The dissolving tank is equipped with two Lightnin mixers.

The green liquor from the dissolving tank is fed to a crystallizer (a salting-type evaporator) which is operated under vacuum to lower the boiling point of the green liquor. A lowering of the boiling point is necessary to encourage the formation of $Na_2CO_3 \cdot H_2O$ which crystallizes in large crystals to facilitate subsequent filtration.

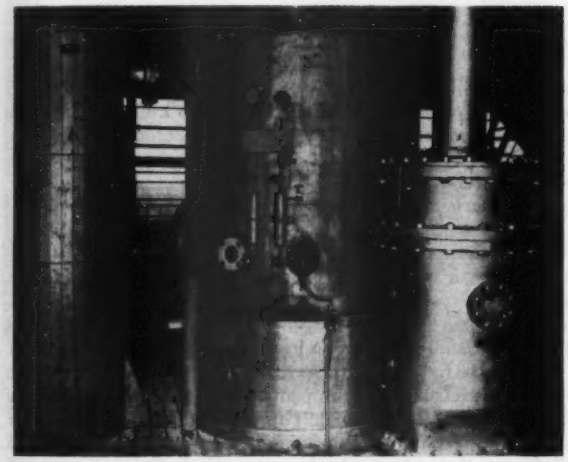
The sodium carbonate crystals formed in the crystallizer are fed to the salt settler and then to the separation filter. Mother liquor (sodium sulfide and carbonate mixture) from both the crystallizer and the separation filter is pumped to the thickener to be recycled with the spent liquor.

The entire operation is automatically controlled from a conveniently located graphic control panel which enables the operator to check all phases of plant operation.

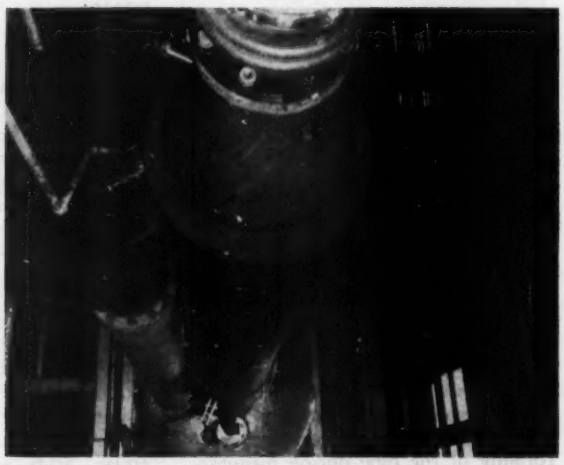
Oxidation tower where sulfides and sulfites are oxidized to the non-corrosive thiosulfates.



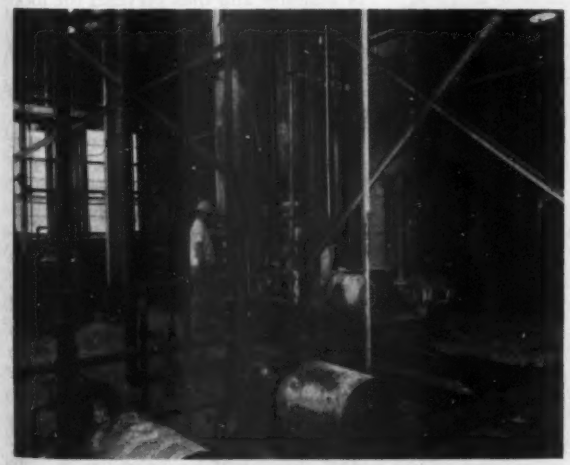
The 75,000 lb. of steam per hour, Babcock-Wilcox recovering unit in which concentrated liquor is burned.



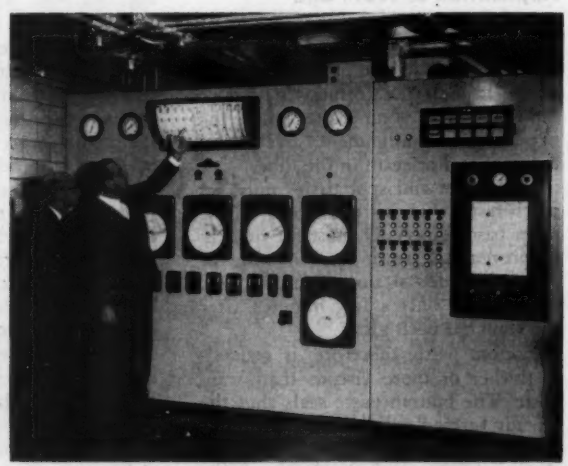
View of the forced circulation evaporator where liquor is concentrated to 65 per cent solids.



View of sodium carbonate crystallizer which is operated under vacuum to reduce boiling temperature.



Base of scrubbing tower seen at the extreme right, where SO_2 is recovered from furnace flue gases.



Plant operations are discussed by H. P. Baldwin, Consolidates' V.P. and R. Q. Boyer, Western Precipitation.

Multiwall bag manufacture at St. Regis Paper Co.

Part II

WALTER J. MACEY
Director of Adhesives
St. Regis Paper Co.
and
EDWARD H. HILL
Technical Representative to the Paper Industry
Corn Products Sales Co.

▶ Paste preparation facilities at the Franklin Mill and the application of seam and spot pastes; development of water resistance; special starch properties and additions in seam and bottom pastes.

PURPOSE of the new improved adhesives for multiwall bags is to produce a water-resistant bond that is stronger after soaking than the paper it joins. Such a bond will cause paper fibers to pull if an attempt is made to tear apart the joined surfaces after they have dried. Today, these bag adhesives are made by combining special starch products with urea resin. After curing, the resulting adhesives give bonds with outstanding wet strength.

Function of the cross or spot paste, which is the first applied, is to hold the inside plies together at the top and bottom ends. By doing so, it facilitates forming of the tube during manufacture. It also insures all ply strength at the top and bottom of each finished multiwall bag.

Application of seam and spot paste

Seam paste is applied just before the side edges of the paper are joined at the heel of the former to produce the tube. The seam paste holds the paper plies in alignment, and makes the final seal or seam in the tube.

Both seam and spot pastes must act much faster than bottom adhesive. The seam paste especially must set quickly to prevent the seam from moving or slipping under strain when the tube is bottomed only a few minutes after the seam has been glued.

Bottom paste, therefore, is generally thicker or more viscous than seam paste. The bottom paste seals shut the already formed and creased tube at the bottom end. This final step completes the manufacture of the bag.

When designing the improved universal tuber now used at Franklin, St. Regis engineers knew that the choice of adhesive for cross pasting would not only determine what metal was used in the pick-up and transfer rolls but also would largely govern the speed of operation of these rolls.

For successful and efficient performance of the new universal tuber, it was essential that the spot or cross paste should have a minimum viscosity of 1000 cps. at 90°F. and a maximum of 2,000 cps at 90°F. It would have to be extremely short, fast drying, pressure resistant and free flowing. It should not sling or throw. It must resist grease, acids and alkalis, withstand heat and cold, and not crystallize. It should be water resistant. Most of all, the adhesive must give a bond stronger than the paper. It should have a binding time on 50-lb. natural kraft of only 2-3 min.

To meet these requirements, St. Regis recently developed its own special formulation based on polyvinyl acetate. Because it dries almost instantly, this special spot paste enables St. Regis to produce finished bags in a continuous operation. Since it does dry so quickly, conveyors can be run from the tuber to the bottomer, and freshly-pasted tubes can be bottomed almost immediately. Previously, tubes had to be stacked on skids to dry before they could be bottomed. This curing or drying took at least 24 hr. for regular kraft bags and sometimes as long as five to seven days for asphalt laminated bags.

Unlike previous adhesives, the special spot paste, because it is resin based, does not kill under the draw roll pressure, usually 480 psi. Formerly, the adhesive was killed in the parts of the bag that undergo this pressure. This weakened the corners or ears of the bags.

St. Regis' seam plate applicator

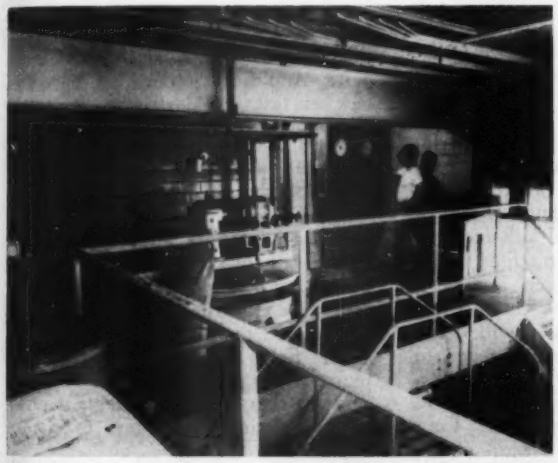
The seam paste unit on the new St. Regis universal tuber at Franklin differs somewhat from other seam paste applicators used in the manufacture of multiwall bags. It is equipped with scalloped wheels and timed with the head. The paste wheels travel at paper speed. Purpose of these scalloped wheels is to eliminate application of adhesive in the perforated area of the tube before it is snapped off. The front and back breaker rolls are grooved. This eliminates squeeze-out of adhesive and thus prevents the locking of bag walls together. The grooved rolls also eliminate the necessity of a pressure-sensitive adhesive.

The seam adhesive, therefore, does not have to be pressure resistant. Otherwise, it should possess all the qualities required in cross or spot paste. Binding time is extremely important. Seam paste must have a binding time of only 2 to 4 min. since the tubes are bottomed within minutes after they are tubed.

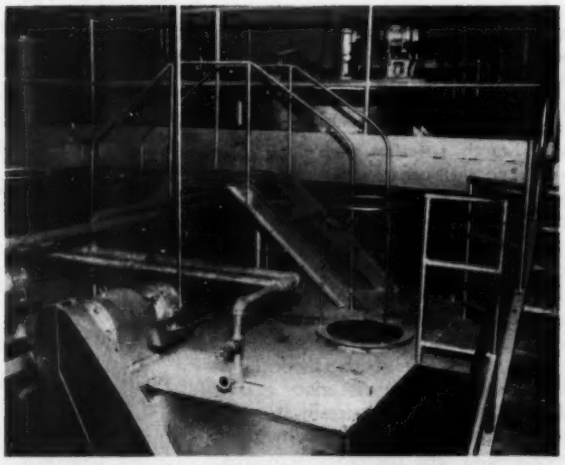
Viscosity of the adhesive is critical when the tuber is running at high speeds. It should stay within 1000 to 1200 cps at 90°F. Higher or lower viscosity can cause channeling of the adhesive by the paste wheels, overflowing of adhesive, skipped seams, stringing, throwing, application of adhesive in the perforated areas or other troubles.

Pallet load of Corn Products No. 7211 adhesive transported by fork lift truck.

E. H. Hill and W. Macey inspect fresh batch of seam paste in 325-gal. cooker.



The 300-gal. vertical cooker is equipped with gate-type agitator.



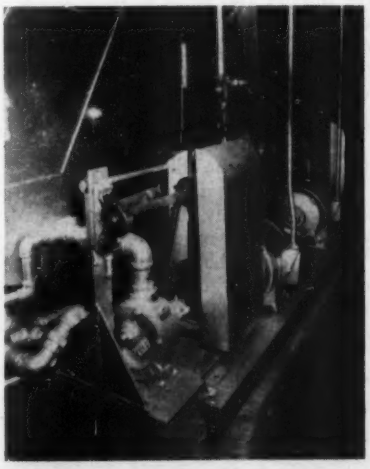
Finished batches of paste are discharged from the cookers into a 1000-gal. storage tank.

St. Regis' bottom paste applicator

In the bottom paste, viscosity, tack and binding time are most important for the efficient operation of the new Burroughs bottomer. On this machine, the bottom adhesive is also used in the sleeving units.

Viscosity of the bottom paste should range from 70,000 to 90,000 cps. at 80°F. If the viscosity is lower, the adhesive will drip from the paste dishes causing bags to become pasted together. On the other hand, a heavily bodied adhesive will not flow properly to the pick-up roll, and will cause skipping in the application of adhesive.

Bottom paste must be short, though with sufficient flow, have resistance to squeeze, and possess good tack. Besides being water resistant, it must have stable viscosity, be non-crystallizing, and withstand extremes of heat and cold after it has dried on the bag. It should have a binding time 8 to 10 min. on 50-lb. natural kraft.



Viking 2-in. gear pump pumps and circulates finished paste.

Thus the type of machine, its speed of operation, the kind of paper and the end use of the finished bags will all determine the choice of adhesive. An effective bag adhesive must be of the proper consistency so that when the machine is operating at high speed it neither strings nor does it throw or spatter. It must not discolor the paper. It must tack fast enough to prevent slowing the machine.

Above all, if it is to be water resistant, it must form a strong bond, one that after immersion for 24 hr. or longer will still pull fibers. It must pull more than 50 per cent fibers to be satisfactory. And only those adhesive bonds that pull fibers across the entire pasted seam can be considered the most effectively water resistant.

How water resistance is developed

Bag manufacturers have long sought a wholly satisfactory adhesive

that would, upon drying and curing, become water resistant. Corn Products has now succeeded in developing such a combination for seams by combining starch and dextrin with a salt catalyst. Urea-formaldehyde resin is added just before cooking. The resin apparently combines chemically with the starch in this formulation, changing its redispersing characteristics. St. Regis has modified this combination somewhat to suit its own particular needs.

Urea-formaldehyde resin is far more effective than formaldehyde in making starch water-resistant. Uncured urea resin is water soluble, and can be readily incorporated in an aqueous dispersion of starch. However, it can be cured by acidity or heat to produce a highly insoluble polymer. It is therefore most useful for developing the water resistance of a starch adhesive.

Starch is essential in the new seam paste not only for its adhesive action but also to get the necessary water resistance at the lowest cost. A film of polymerized urea resin by itself is easily friable. On the other hand, when starch, together with dextrin, is combined with urea resin, the resulting seam adhesive shows good bond, no loss of adhesion, and no friability.

Moreover, water resistance appears to depend upon the copolymerization of urea resin with the starch. Dextrin and resin, without the starch, do not develop adequate water resistance.

Just how water resistance develops during the curing is not exactly known. Starch and urea resin are compatible since both possess hydroxyl groups and are therefore somewhat similar in character. Most likely, the urea-formaldehyde resin reacts with the free hydroxyls in the starch, effectively blocking these groups so they can no longer pick up water. Any free formaldehyde coming from the resin would similarly block the hydroxyl groups and help to insolubilize the starch. It is also possible that as the urea resin cures it forms a highly-insoluble coating over the less water-resistant starch particles. Water resistance may likewise result in part from a tendency of the starch to revert to its water insoluble state.

It is certain, however, that a combination of starch and dextrin adhesive with urea-formaldehyde resin, when properly cured by catalyst-developed acidity, produces an adhesive bond that is much stronger after soaking than the paper surfaces it unites.

Selection of the proper starch for the adhesive base is crucial in forming a water-resistant paste with urea resin. The ease with which the starch and resin combine will depend on how much the starch has been modified or degraded. The less the starch has been broken down or disorganized, usually by hydrolysis, the fewer free hydroxyls there will be in its molecular structure, the easier it will be to insolubilize, and the less resin will be required to develop water resistance.

Offsetting this, however, is the requirement that the starch must be modified or hydrolyzed sufficiently to get the requisite flow characteristics in the finished paste. For as the starch is cooked it gelatinizes or becomes pasted, and its viscosity increases. Moreover, it is mainly the thickness of the starch that determines the viscosity of the finished adhesive. Therefore, the starch must be modified considerably so that it will not thicken too much when cooked.

Special starch properties and additives in seam pastes

Accordingly, in the new No. 7211 starch for seam adhesive, a specially-modified product is used that has been hydrolyzed to lower its viscosity. This thin boiling starch is of the pearl type. A thin boiling starch is employed instead of a thick boiling type to increase the solids while preventing undue thickening of the finished paste.

To get the fast initial tack required in seam paste for high machine speed, dextrin is necessary even though it adds to the cost of the formulation. The type of dextrin used will determine how much water is needed to prepare an adhesive of proper working viscosity, tack, drying time, bond and adhesive film flexibility. Corn Products uses a white dextrin of the low soluble type. When the dextrin and starch are combined, of course, the water solubility is somewhat reduced. Since the dextrin is more highly hydrolyzed than the starch, its addition must be carefully limited. Only enough must be added to give sufficient tack. The dextrin also helps to increase the solids without thickening the paste too much. And since the finished paste must be acidic for curing to occur, an acid dextrin is used to avoid an increase in pH.

To develop water resistance reasonably soon after the adhesive is applied, a salt catalyst is incorporated in the adhesive. Actually, the effective catalyst is the hydrogen ion.

The greater the hydrogen ion concentration or the lower the pH, within certain limits, the faster will polymerization occur. Increasing the temperature also speeds up curing. However, the faster polymerization takes place, the shorter is the working life of the adhesive. As it sets, the adhesive becomes more viscous and pasty so that it cannot be handled or pumped. It is necessary therefore, to balance the rate of development of water resistance against the rate of increase of viscosity.

Best results from the standpoint of pot life and machine operation are achieved when the starch and dextrin are cooked with urea resin at about 195°F. and a pH between 6.0 and 6.5 in the presence of a salt that can act as a plasticizer and catalyst for the reaction between starch and resin. Seam paste made this way cures and becomes water resistant within five to seven days after it has been applied.

Water resistance is similarly developed in bottom paste by the combination of starch and urea resin during curing. However, bottom paste, which has a slightly lower solids content than seam paste, is made with Corn Products No. 5063 starch. While it is also thin boiling, this starch has not been modified or hydrolyzed as much as the thin boiling starch used in seam paste. Bottom paste is therefore thicker or move viscous than seam paste. And since it does not have to tack as fast, no dextrin is required in bottom paste.

St. Regis' paste preparation facilities

The modern glue room at the Franklin plant has an attractive tile lower wall, making it easier to wash down and keep clean. Any dust or fumes are exhausted by fan.

There are two large cookers and one small cooker for making adhesives, plus two large storage tanks for finished batches. Today, St. Regis is rapidly converting its cookers to stainless steel.

The large cooker of most recent design is of 325-gal. capacity. It is rectangular at the top, flat at both ends and rounded on the bottom. It has a horizontal ribbon-type agitator. The other large cooker is of 300-gal. capacity. It is a vertical cylinder with a round bottom. In fact it appears to be almost hemispherical. This cooker has a gate-type agitator. The agitators on both cookers are each driven by a 3-hp., 1200-rpm. General Electric explosion-proof motor, and rotate at 25 to 30 rpm. Both cookers are jacketed for cooling.

The small cooker, of 100-gal. capacity, is likewise jacketed. It is a vertical cylinder with a dished bottom. Its gate-type agitator, with a 1½-hp., 1800-rpm. motor drive, turns at 25 to 30 rpm. This small cooker is used for making sewing machine adhesives, sleeving and other special adhesives.

St. Regis cooks only with direct steam. The jacket is used only for cooling water. This eliminates any unwanted baking on the inside wall of the cooker.

(Continued on page 181)

Adhesives in the paper industry

Part V (continued)—Vegetable-base adhesives—cellulose adhesives

CELLULOSE adhesives may be considered to be of vegetable origin because the parent cellulose is, of course, an important member in the plant kingdom. On the other hand, it must be pointed out that once the cellulose is modified by the variety of chemical reactions, the final products are more like resins and plastics than they are like the normal adhesives of vegetable origin. Because of the source of their basic raw material, however, they are considered here under vegetable adhesives.

As Table IV indicates, the hydroxyl groups of cellulose make possible the preparation of two types of chemical derivatives — esters and ethers. The esters may, of course, be either inorganic or organic. In the former category, the nitrate is the outstanding example. Cellulose nitrate, or nitrocellulose, is an excellent adhesive and is the basis for the well-known "Duco" cement. The organic cellulose esters include acetates, propionates, mixed acetate propionates and mixed acetates butyrates. Their properties are quite different from nitrocellulose as are their applications. Nitrocellulose, of course, is the basis for fast drying lacquers of the type used on automobiles and furniture. Organic cellulose esters find lesser usage in lacquers but are extremely useful in the preparation of fibers.

The cellulose ethers also fall into two categories — those which are soluble in organic solvents and those which are soluble or dispersible in water or alkali. In the former category are ethylcellulose and benzylcellulose. On the other hand, methylcellulose and hydroxyl ethylcellulose are water-dispersible, whereas carboxymethylcellulose is dispersible in alkali.

The structure of cellulose is indicated in Table IV as a polymeric material with a recurring cyclic unit containing three hydroxyl groups. The cyclic unit is an anhydro glucose group for which reason cellulose may be considered as a polymer of glucose. Native cellulose may have a molecular weight of over one-half million indicating the presence of more than 3500 recurring units. Cellulose from wood pulp may have a molecular weight varying from 90,000-210,000. The lower molecular weight in wood pulps is due to the fact that degradation occurs during processing. This degradation is even more pronounced in derivatives like cellulose acetate which may have molecular weights of 45,000-100,000.

Molecular weight is one of the important factors in determining the properties of the derivatives. The second important factor is the degree of substitution which is an expression of how many hydroxyl groups on each glucose unit have entered in the reaction.

Nitrocellulose, the oldest and best known of the cellulose derivatives, was one of the first commercial plastics and was well-known in the last half of the 19th century in the guise of celluloid. It came into its own in World War I, particularly when inexpensive solvents became available, which made possible its use in the automobile industry as a protective coating. Prior to that time the chief use of nitrocellulose had been as an explosive. For explosives, the degree of substitution must be high, whereas for use in coatings and adhesives, a "soluble" type of resin must be produced which is less highly substituted.

Nitrocellulose is produced by reacting cellulose with anhydrous nitric acid or else with aqueous nitric acid mixed with sulfuric or phosphoric acids to remove the water. The latter process is the one used commercially. Nitrocellulose is always sold wet with solvent to reduce explosion hazards.

The nitration is carried out at a controlled temperature, after which the ester is removed by centrifuging and is washed with water until all of the acid has been removed. Washing with alcohol then follows to remove the water.

Because nitrocellulose adheres well to leather, it is used in the shoe industry, particularly for cementing shoe soles to uppers. The formulation of nitrocellulose into adhesives and cements is relatively simple, requiring, in addition to the nitrocellulose, a plasticizer and solvents which may comprise acetone, butyl or amyl acetate, alcohol, aromatic hydrocarbons and related materials. A common plasticizer for nitrocellulose is camphor. Modifying ingredients which have been proposed include oxalic acid, gum ammoniac and resinous materials such as phenolic condensates and alkyds and sulfonamides. The addition of resinous products leads to greater strength, waterproofness, flexibility and resistance to the action of oils and greases.

Nitrocellulose may also be formulated into aqueous emulsions by the

use of protective colloids such as starch, methyl cellulose or polyvinyl alcohol.

Various putties, based on cellulose nitrate filled with aluminum powder, have been devised. Ethyl cellulose may also be used in these compositions.

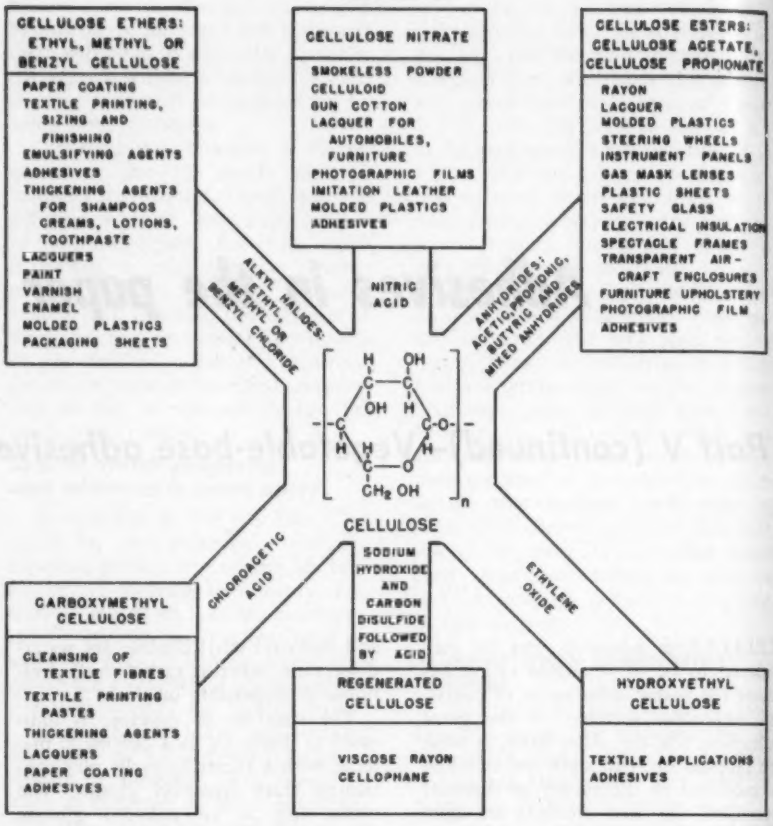
As indicated above, the important organic esters of cellulose are the acetate, the propionate, the acetate propionate, and the acetate butyrate. The propionate is produced in lowest quantity. The acetate achieved importance during World War I where it was used in place of nitrocellulose for aircraft dopes. Subsequently, it was developed into a fiber which has achieved wide utilization. Also, cellulose acetate was perhaps the first plastic to be used commercially in injection molding. This type of molding has accounted in large measure for the rapid growth of the plastics industry. Cellulose acetate is prepared by combining properly prepared cellulose with acetic anhydride, acetic acid, and sulfuric acid, the acetic acid serving as a solvent for the product.

The largest use of cellulose acetate is for the manufacture of fiber. Cellulose acetate film is also important in the packaging industry. It may be used for photographic film where it is preferred because it is less flammable than nitrocellulose. On the other hand, nitrocellulose is used largely in commercial motion picture film because of its more desirable properties.

The cellulose ethers, ethyl cellulose and benzyl cellulose, are manufactured by reacting cellulose with ethyl chloride and benzyl chloride respectively, in the presence of alkali. Benzyl cellulose, however, is produced in very low volume because the product is unstable to light and heat. On the other hand, it has excellent water-resistance and high grade electrical properties.

Etherification is carried out by treating a mixture of cellulose and sodium hydroxide with ethyl chloride. The cellulose is combined first with aqueous sodium hydroxide to produce what is known as alkali cellulose. The etherification takes six to twelve hours at 90 to 150° C., and the degree of substitution is controlled by sodium hydroxide concentration. The viscosity of the product on the other hand, is related to the viscosity of the starting cellulose which, in turn, is a function of the molecular weight of the cellulose. One of the important applications of ethyl cellulose in adhesives is in hot melt formulations. Here, the ethyl cellulose is combined with plasticizers, oils and resins, and wide variations in melting point and other properties are possible.

TABLE IV

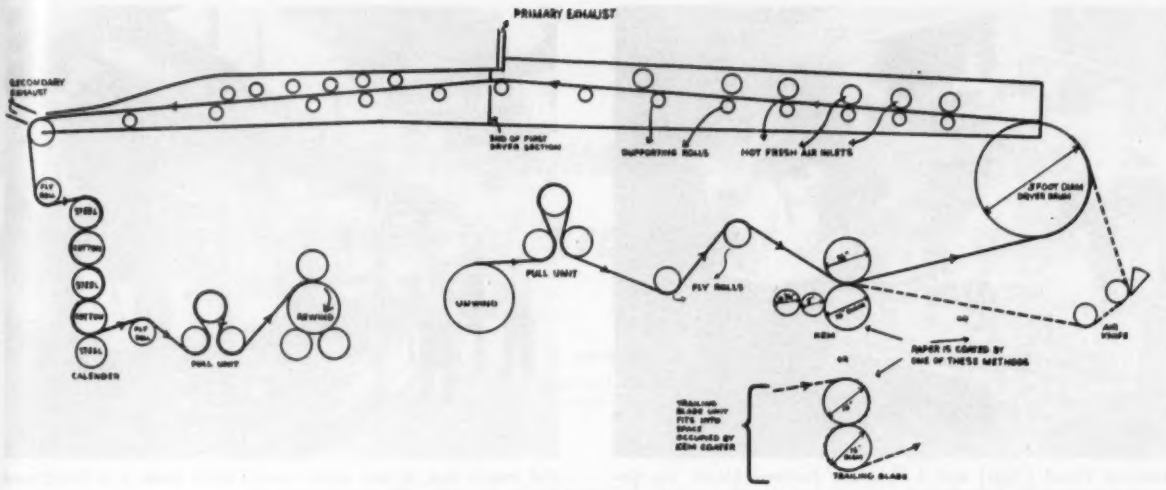


As has already been indicated, methyl cellulose, unlike the ethyl cellulose of commerce, is a water-dispersible material. Methyl cellulose is used as an adhesive and binder and has replaced to a large degree the water-soluble gums discussed above. It is used as a greaseproof coating for paper, as a thickening agent in face creams and ointments, and a protective colloid in emulsions.

Hydroxyethylcellulose results from the treatment of alkali cellulose (cellulose plus sodium hydroxide) with ethylene oxide. Actually, two types of hydroethylcellulose are available. One of these is alkali soluble and the other is water soluble. The alkali soluble product is used largely as a textile finish, whereas the water soluble material finds application as a binder adhesive, protective colloid and film former. Like methyl cellulose, it may be used in the greaseproofing and sizing of paper. It is also used as a pigment and dye carrier in textile printing.

Carboxymethylcellulose is prepared by treating alkali cellulose with the sodium salt of chloroacetic acid. As with derivatives prepared similarly, the degree of substitution depends on the concentration of alkali, whereas the viscosity depends on the molecular weights of the original cellulose. Sodium carboxymethylcellulose can replace many of the vegetable gums such as gum tragacanth. It is used as an extender for synthetic detergents where it prevents redeposition of soil. Its properties as a protective colloid cause it to find application in the food and pharmaceutical industries. It is also used in drilling muds and, of course, in certain adhesive applications.

Ethyl cellulose may be formulated into lacquer-type adhesives by the use of solvents such as benzene, toluene and naphtha, combined with hydrophilic solvents such as ethyl or butyl alcohol or kentones. Methyl cellulose is used in adhesives as a thickening agent and as a protective colloid. It adheres strongly to paper and is valuable as a greaseproof adhesive. Carboxymethylcellulose has been recommended for use in wallpaper adhesives, particularly abroad where starch is not as plentiful as it is here.



Schematic drawing of 45-ft.-long laboratory coater.

National Starch and Chemical Corp. installs new experimental paper coater

▶ The new coater is capable of simulating paper mill operating conditions and is equipped with coating heads that will perform all six major coating operations.

WITH THE INSTALLATION of a new paper coater — which is capable of coating, drying and calendering paper in a continuous operation and at speeds up to 2000 fpm — National Starch and Chemical Corp. is now equipped to investigate all coating problems confronting the paper and paper converting industry and provide a customer service by evaluating new coating materials in line with customers' specific requirements.

The unique advantages of National's new paper coating installation include: (1) the ability to simulate a paper mill's operating conditions under laboratory control conditions, which among others will permit to isolate and study many of the still unexplained variables in the paper coating field and (2) the ability of the coater to do all six major types of coating and sizing operations, i.e., air knife, trailing blade, roll, reverse roll, size press, and modified size press coating. The addition of gravure and offset gravure coating rolls is also being planned.

Other research investigations pursued by National and in which the new coater will play a decisive role are research on cationic starches for coating binders and the development of (1) new and improved water-resistant binder systems; (2) lightweight coating methods for publication papers; (3) resin materials for functional coating purposes such as grease-proofness and low water vapor transmission qualities; and (4) new and improved methods of coating with standard binders.

Description of coating rolls

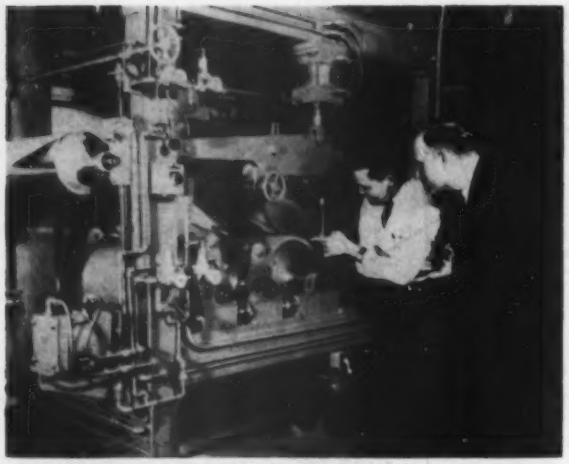
The 45-ft. long coater, manufactured by Wheeler Roll Co., is equipped with 24-in. face coating rolls capable of coating a sheet of paper up to 20 to 22 in. wide. All coating rolls are variable in speed in respect to the drive input in a ratio of 50 to 200 per cent.

The air-knife coater is a Waldron Type-A, Uniflo Microjet. It is equipped with a standard coating trough, coating applicator roll and breast roll. Air is supplied by a 10-hp centrifugal blower.

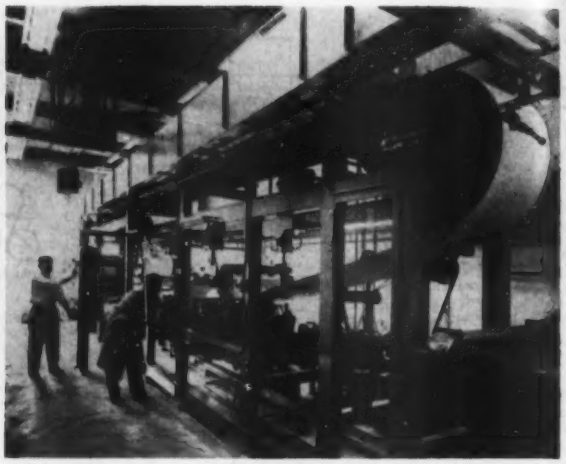
The trailing-blade coater features a standard flexible spring steel blade and adjustable lucite dams with spring-loaded faces. It is equipped with three controls for automatic positioning.

The KCM coater features a driven 16-in.-dia. brass backing roll, a 16-in.-dia. 85 P & J hardness bottom (applicator) roll, an 8-in.-dia. chrome roll, and 12¾-in.-dia. 60 P & J hardness gate roll.

The size press is equipped with a driven 16-in.-dia. brass top roll and



Leonard Wood (right) and J. Kronfeld, National Starch, are discussing coating head operations.



Full length view of new paper coater. Dryer drum is in foreground and heating tunnel is shown overhead.

a driven 30 P & J hardness rubber bottom roll.

Dryer section

Drying equipment consists of a gas-fired heater, dryer drum, air inlet ducts and a two-stage dryer tunnel.

The dryer drum is a 3-ft.-dia. double-shell, chrome-plated drum designed for a steam pressure of 100 psi. Its centrifugal speed is controlled by an electronically-activated, mechanically operated brake.

The heating system supplies 3000 c.fm. of heated (450°F), filtered air to the dryer tunnel. Outside air is brought in by a 5-hp suction fan, filtered and fed to the combustion chamber where it is heated. From here, a blower unit feeds it to the dryer ducts.

The dryer tunnel consists of two drying stages and a high velocity section. The first stage is supplied from six variable-direction air inlets mounted so as to be only 1 in. from the sheet at the closest point. It is further equipped with 10 radiant infrared heaters mounted in series. Waste air is vented from the section by a 2-hp exhaust fan system. The second stage is identical with the first stage with the exception that there are no radiant heaters.

The high-velocity section, in which air velocity approaches the speed of sound, has a variable air foil with minimum clearance at the outlet end of ⅛ in. above sheet level. It is equipped with a 2-hp exhaust fan system.

Drive system

The drive system consists of a 30-hp motor generator set driven by an AC Louis Allis motor, a central drive shaft running full length of the machine, right angle gear boxes, PIV units, and reversing gear boxes.

All load-bearing roll speeds are independently controlled by PIV units which permit speed variation of 50 to 200 per cent of input speed. The calender stack is driven by direct take off from the line shaft. The speed of the line shaft varies inversely with amount of DC power shunted off the motor-driven generator.

A manual clutch is installed between rewind and other sections of the machine to disengage coater units when only calender is operated.

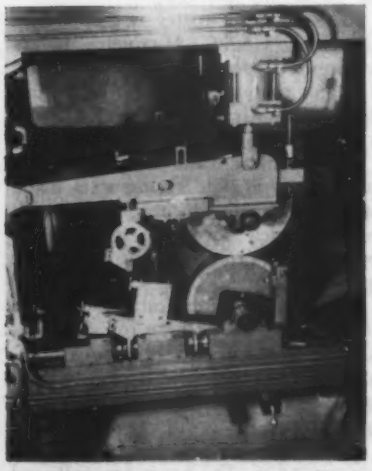
Other features

A total pressure of 2500 pls. can be applied on the calender rolls. Pressure is loaded from 6-in. air cylinders. The center metal roll of the calender can be either steam heated or water cooled according to requirements.

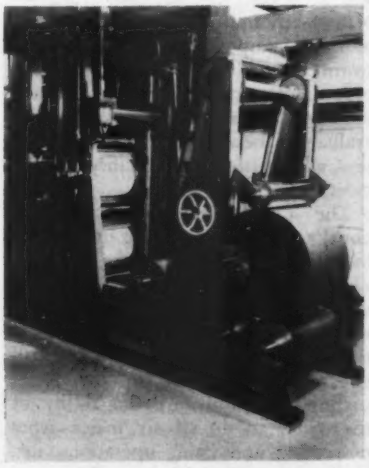
The super calender has three steel rolls and two 15-in.-dia. cutter rolls.

The rewind and unwind units are located near the calender so that paper can be calendered independently of coating operation. The water-cooled unwind unit is equipped with a manually-operated brake. The rewind unit is a double-drum-surface winder type. The pull unit and rewind are operated in tandem by a common PIV unit.

A central panel is equipped with individual controls for each motor, ignition system, three sets of infrared heaters, input controls for infrared heaters, main speed control and brake control.



Trailing blade coating equipment.



Calender stack and rewind.

Application of green liquor phase separation to the intergration of kraft and sulfite mills

R. Q. BOYER
Principal Chemical Engineer
Western Precipitation Corporation

The application of three chemical tools, i.e. green liquor phase separation, 50 per cent sulfidity rule, and sulfide desulfonation reaction, is described in an integrated kraft and NSSC recovery system.

WE HAVE BEEN working with three chemical tools which should be considered in integrating kraft recovery with neutral sulfite semi-chemical production. Briefly, these tools are: (1) green liquor phase separation, (2) the 50 per cent sulfidity rule, and (3) the sulfide desulfonation reaction with sulfite liquor. The explanation of these rules are stated here: The first is based on the principle that sodium carbonate may be separated from the smelt up to a 90 per cent sulfidity of the mother liquor. The second principle is the fact we have established that, through a wide range of conditions, the sulfidity of the smelt will not rise above 50 per cent. The third tool which we have developed is that sulfide may be reacted with any spent sulfite liquor to produce a kraft type liquor. Applications of these principles depend upon the availability of a unit process to separate, as a solid, pure sodium carbonate from the green liquor.

Development of the phase diagram

Let us briefly review the historical background of the development of the phase diagram for the system sodium carbonate-sodium sulfide-water.

In 1927 Dr. G. A. Day utilized a dissolver at the LaTuque kraft mill of the Brown Company for a selective solubility study (1). The method was to raise the concentration in the dissolver by running in smelt. After the Baumè of the mother liquor became constant with continued smelt additions, the analysis of the liquor indicated an increase in the ratio of sodium sulfide to sodium carbonate. The amount of solid carbonate produced was computed from the data. The report recommended that the method be used to produce sodium carbonate by filtering the slurry. On the basis of this work Mr. G. A. Richter suggested that the method be used in the recovery of base from the burning of a combination of kraft and neutral sulfite liquors (2). The mother liquor would be used as the "green liquor" of the kraft process and the sodium carbonate would be sulfited for use as the "cooking liquor" of the neutral sulfite process.

Dr. Viggo Drewsen, then Research Director of West Virginia Pulp and Paper Company, noted that, in shipping some "black ash" to another laboratory for experimentation, a "mother liquor" was formed which had a much higher ratio of sodium sulfide than the parent material (2). Dr. Pollock, then with the same company, used an evaporator technique to determine the solubility data at the boiling point. The results were reported in terms of "sulfidity" vs. the boiling point at atmospheric pressure. Knowledge of these data is exhibited in Drewsen's patents on the direct oxidation of smelt to sodium sulfite (4). Aries and Pollock have recently been issued a patent on a slight modification of Day's method of selective dissolving of the smelt (5). In this patent they give the practical limits of the method in terms of the concentration of sodium sulfide. Sandberg in Sweden and Thompsen in the U. S. have obtained patents describing the separation of sodium carbonate and sodium sulfide by means of evaporation-crystallization in sodium base recovery processes (6, 7). In neither of these processes do they give any operating condition for the separation.

The Institute of Paper Chemistry has been continuing an investigation started by an individual paper company. As part of this investigation the high carbonate (less than 50 per cent sulfidity) range of the system was determined. Western Precipitation Corporation developed the high sulfidity (above 50 per cent) range and ran one temperature completely through the sulfidity range from 0 to 100 per cent.

The phase diagram predicts that a satisfactory separation of the sodium carbonate is obtainable. The phase diagram checks all of the previous work. It is, as should be expected, similar to the system sodium hydroxide-sodium carbonate-water. We have found that it was consistent with the results of our experiments with the isothermal recrystallization process (8). We have run a sub pilot evaporator-crystallizer with green liquor. The evaporation-crystallization experiments were consistent with the results of the phase diagram.

Integration of kraft and NSSC pulping

Integration of kraft with neutral sulfite is a straight forward chemical engineering problem. It is controlled by two things, material balance and compatibility of the mixed kraft and neutral sulfite liquors. Without any green liquor treatment and simply using the green liquor for the kraft mill, the problem is controlled by the base requirements of the kraft mill. This is to say, that you cannot add any more neutral sulfite liquor to the recovery system than its content of base equivalent to the base consumed by the kraft mill. The sulfur makeup of the kraft mill in this case is equalized by adding either sulfur or a high sulfur salt to the recovery circuit.

We have found semichemical mills which run from 250 lb. to 600-700 lb. of sodium carbonate to a ton of pulp. Therefore, it is difficult to pick typical examples. I have picked out probably the average of 485 lb. of sodium carbonate per ton of pulp with a 70 per cent yield, where four-fifths of the sodium in the cooking liquor is in the form of sulfite, and one-fifth in the form of bicarbonate or carbonate. With this ratio and taking into consideration everything we calculate — the actual usual rule — four tons of kraft must be made to integrate one ton of neutral sulfite semichemical. This limit on integration is just due to the fact that the kraft mill cannot dispose of any more base. some people think that they are doing a better job of integration by letting more base from the kraft mill go to the stream; however, this has its problems.

By separation of sodium carbonate from the smelt you can create the situation that, instead of controlling by base make-up requirements, the kraft mill controls the integration by the amount of sulfur it consumes. This opens up considerably more integration. You can add to the recovery, from the sulfite circuit, liquor with the content of sulfur equivalent to the kraft mill needs. You can separate out from the circuit and send to the sulfite mill all the sodium carbonate which goes to the recovery system from the sulfite mill that is not combined with sulfur. In addition you can separate out additional sodium carbonate so as to balance the base requirements of the kraft mill. Indeed, the kraft mill by this arrangement supplies the neutral sulfite with sodium carbonate in exchange for sodium sulfite.

With a typical pulping ratio such as was used as an example, you can use in recovery two tons of kraft to each ton of neutral sulfite. While the cooking liquor of neutral sulfite contains probably only 20 per cent sodium uncombined with sulfur we find quite a loss of sulfur in the neutral sulfite circuit so that about 37½ per cent of the sodium coming to the recovery circuit from the neutral sulfite mill will be uncombined with sulfur. The limit on this technique is the ability of the kraft mill to consume sulfur. As long as we follow this principle then the sulfidity will stay at the kraft level. The minute you exceed the amount the kraft mill can absorb, the sufidity will rise rapidly. The excess sulfur will be volatilized into the furnace gases as SO_2 and will be picked up again by the direct contact evaporator and returned in a very short time to the furnace. This short circuit of the SO_2 will cause a build-up of the sulfur in the thick liquor. Therefore, you have the situation of the liquor precipitating in the direct contact evaporator due to an acid condition from SO_2.

Applying the 50 per cent sulfidity rule

In order to free a mill from a material balance from either a base or sulfur makeup control, we can apply both of the first two principles listed. But using the 50 per cent sulfidity rule requires considerable equipment revision. For instance, to increase the integration if required by a high kraft recovery capacity above the critical ratio, you would have to remove the direct contact evaporator and provide additional gas cooling with either boiler surfaces or with an acid-resistant direct-contact evaporator in which you would process only the neutral sulfite semichemical liquor and then provide in back of the fume gathering device an SO_2-sodium carbonate scrubber. This makes a considerable change in operation. In addition, a forced circulation finishing evaporator will be needed to bring the liquor up to strength for burning.

In applying the 50 per cent sulfidity rule, as you continue to increase the amount of neutral sulfite added to the kraft circuit, the excess sulfur which is going into the furnace from the neutral sulfite mill will finally appear in the furnace gases as SO_2 above that necessary to maintain the 50 per cent smelt sulfidity. You would naturally like to collect this SO_2 out of the gases; however, it could be disposed of into the air.

I would like to state one thing about this 50 per cent sulfidity rule as it might be called. This rule does not apply to any sulfate which is added to the furnace circuit. Sulfidity will rise above the 50 per cent limit, if a large amount of sodium sulfate is added to the furnace. Sodium sulfate remains stable and is converted to sodium sulfide without any release of sulfur into the furnace gases.

What then to do with the excess sodium sulfide which you now have in the smelt? The trick is to force this 50 per cent sulfidity rule to work for you by, in one way or another, sending the sodium sulfide directly back to the furnace. There are two ways of doing this: First, you can simply take the sodium sulfide and mix it with the thick liquor going to furnace sprays. It is added to the thick liquor in the form of a 30 per cent solids solution. In this case, the added sodium sulfide is converted and almost quantitatively to sodium carbonate. That is, the additional sodium sulfide which was added to the thick liquor — by carbonation during the charring — converts to sodium carbonate. This particular trick tends to hold the sulfidity down so that the 50 per cent sulfidity rule does not come into effect immediately. The driving off of the excess sulfur that cannot be used by the kraft mill tends to hold down the sulfidity below the 50 per cent limit.

Sulfide disulfonation reaction with spent sulfite liquor

There is another way of returning the excess sodium sulfide produced from the smelt to the furnace — by applying the third tool, the sulfide reaction with the sulfite liquor to produce a kraft type liquor. It has some very definite advantages. However, using this technique, if you exceeded the sulfur material balance limit you will find that you immediately have the 50 per cent smelt sulfidity because the thiosulfate, in which form the reacted sodium sulfide finally appears, is not quantitatively converted but is converted instead by the 50 per cent rule to sulfur dioxide sodium carbonate and sodium sulfide.

The liquor compatibility becomes increasingly difficult as the ratio of neutral sulfite is raised compared to that of kraft liquor. Some mills have given up trying to evaporate the kraft and sulfite together; instead they have used the expedient of bringing their kraft liquor up to a high concentration in the vacuum evaporators and then adding the neutral sulfite thin liquor into the direct contact evaporator for its evaporation.

This compatibility is mainly a pH problem. Kraft liquor contains a hydroxylignin which, as the pH is lowered, tends to precipitate on concentration of the liquor. It took us a long time to learn this from our own experience. We found out later that many people have had this experience

(Continued on page 182)

N.Y. State College of Forestry holds Second Cellulose Conference

LOUIS E. WISE

Many new disclosures concerning the chemistry of cellulose made at the 2nd Cellulose Conference held in Syracuse, N. Y.

THIS MEETING, sponsored by the Research Institute of the State University College of Forestry, on May 7-8, was a remarkable success. About 150 chemists were in attendance. At least 12 dissolving pulp manufacturers, 13 pulp and paper companies, and 14 large chemical corporations were represented, often by more than one staff member. Both American and Canadian university professors were in evidence, with faculty members from McGill, Toronto, Queens, Cornell, Syracuse, Princeton, and the State University of New York. The Research Laboratories of the U.S. Department of Agriculture in Peoria and at New Orleans sent some of their chemists, as did the Institute of Paper Chemistry at Appleton and the Pulp and Paper Research Institute in Montreal. Needless to say members of the staff of the New York State College of Forestry were active catalysts at the meeting, special credit for which should go Prof. J. J. Hermans and to Associate Dean E. C. Jahn.

Technical papers

The meeting was opened by Dr. Hermans, Director of the Cellulose Research Institute, who introduced the first chairman, Dr. O. H. Alderks, Buckeye Cellulose Corporation of Memphis. He turned the meeting over to Prof. J. K. N. Jones of Queens University, who spoke on the **Structure of Some Water Soluble Polysaccharides** of wood, and presented the work of his co-workers, Dr. D. J. Brasch, J. T. Painter and P. E. Reid. Dr. Jones showed that besides the well known galactans and arabogalactans extracted from coniferous woods (especially the larches), certain pines yielded small amounts of polysaccharides rich in mannose units and containing such sugar units as glucose and galactose, which were structurally very different from the arabogalactans.

The second paper, embracing the work of Drs. T. J. Painter and T. E. Timell of the Pulp and Paper Research Institute in Montreal, was presented by the latter. (Cf. also Painter, *Can. J. Chem.* 37.497 (1959)). It dealt with the graded **Enzymatic hydrolysis of Wood Polysaccharides,** using a new and ingenious technique. A cellophane semipermeable membrane enclosed an aqueous solution of the polysaccharide and a suitable enzyme. Outside of the membrane was a large volume of water. Thus, any oligosaccharides that were formed hydrolytically were removed promptly by diffusion, and escaped more extensive hydrolysis. The method when applied to a hardwood hemicellulose gave a series of xylose oligosaccharides and a resistant residue. The application of this method may be of fundamental importance in future studies of the polysaccharides.

"Weak links" as inductive effects in the hydrolysis of cellulose and polysaccharides were discussed by Dr. B. G. Ranby, as a result of his work and that of Dr. Marchessault at the American Viscose Corporation. Dr. Ranby now heads the ESPERA group at the College of Forestry. The work on "weak links" was recently published in *Svensk Papperstidning* 62, No. 7 (1959).

Reasons for pulp yellowing were covered in a paper by Dr. H. Sihtola of the Finnish Pulp and Paper Research Institute of Helsinski. His work sought to clarify some of the factors causing reversion when pulp is aged or heated (under rather drastic conditions), and to develop methods that would give pulps the greatest possible color stability. Cotton cellulose, rather than wood pulp, was subjected to varying degrees of oxidation with periodite. These products were then treated separately with the following reagents: chlorous acid, chlorine dioxide, caustic soda, hydrochloric acid and sodium borohydride. Individual products were then subjected to various analyses, and the following conclusions were drawn. End aldehyde groups in oxidized cellulose do not give rise to yellowing, whereas those on carbon atoms 2 and 3 may cause intensive yellowing. Primary hydroxyl groups in positions 2 and 3, formed by the reduction of "dialdehyde cellulose" by means of borohydride do not cause reversion (i.e. yellowing). Carboxyl groups on carbon atoms 2 and 3 caused extensive yellowing which increased when these free carboxyls were converted into the sodium salts (but not by conversion

into the calcium salts). Alkaline or acid depolymerization does not greatly change the yellowing tendencies of the dialdehyde cellulose. Dr. Sihtola reported that studies now in progress are directed towards finding bleaching methods that will cause the least possible formation of groups which normally cause reversion. This paper caused an interesting discussion by Dr. Rapson of Toronto and by Dr. I. Jullander of Ornkoldsvik, Sweden.

In the afternoon the conference was continued under the chairmanship of Dr. W. A. Sisson, American Viscose Corporation, Marcus Hook. A highly theoretical paper dealing with the **Structure and Conformation in Native and Mercerized Cellulose,** by Drs. C. Y. Liang and R. H. Marchessault, of American Viscose Corporation, was presented by the latter. Infra-red spectra of oriented films of Valonia cellulose and of the crystallites of ramie and bacterial cellulose were studied and polarization properties of the bands were determined. The difference in these polarized spectra were discussed and attributed to the percentage crystallinity and to orientation effects. Several new CH bands were observed and on the basis of this information, symmetric and antisymmetric modes of stretching described. Similar studies on the polarized infrared spectra of mercerized cellulose crystallites from ramie and Fortisan were also made, and interpretations were given in terms of hydrogen bonding and chain conformation.

The Borohydride Reduction of Pulps was the subject of a paper given by Dr. Ingvar Jullander of Mo Och Domso Aktienbolag, in Sweden. At present this appears to be an area of great interest. Both sodium and potassium borohydrides effectively reduced carbonyl groups in cellulose, but a great excess of these reagents was required when wood pulps were to be reduced, due to the destruction of the reagent by water with formation of hydrogen. In aqueous pulp slurries the addition of such cations as lithium, calcium, barium and magnesium (but not sodium or potassium) increased the efficacy of the borohydride. Bleached sulfite and kraft pulps were reduced with varying amounts of sodium borohydride, the action of which was monitored at intervals by the determination of the copper number. The yellowing of such treated pulps after heating 16 hours at 120° C., in the dark, was also determined, and these results were expressed as the "post-color" (p.c.) values. By plotting the p.c. values against the copper numbers, it was possible to extrapolate to zero copper number. About one half of the brightness reversion could be ascribed to the carbonyl groups in the pulps. However, the resin content was shown to have a measurable influence on pulp yellowing.

The Xanthation Reaction and the Ripening of Xanthates were discussed by Dr. D. Vermaas, of N. V. Onderzoekings Intituut Research, AKU, Arnhem, Netherlands. Because the literature on cellulose xanthation is full of contradictions, the author explained that a possible aid in studying the reactions might be found in examining the related reactions of a simple model substance like ethyl xanthate. The slow decomposition of this model compound in alkaline solution was studied. This results from the removal of carbon bisulfide from the mixture by means of caustic soda. The effects of the sodium hydroxide, sodium sulfide and ethanol concentrations on the velocity of ripening were investigated. In the case of viscose (qualitatively at least) similar effects were observed, and apparently the mechanism, in principle, was similar, despite certain complications possibly associated with the secondary hydroxyl groups in cellulose. Another complicating factor was the oxidation of sulfide and thiocarbonate by atmospheric oxygen during the course of commercial viscose production. Such oxidation products may accelerate ripening; this could be prevented by the addition of suitable reducing agents.

Following Dr. Vermaas came the presentation of two fundamental papers dealing with work done at the New York State College of Forestry and the Cellulose Research Institute. The first article, **The Spectroscopy and Photochemistry of Cellulose-tendering Dyes** was by E. W. Abrahamson, I. Panik, and K. Sarkanen, and was presented by Dr. Abrahamson. Several classes of "non-tendering" and "tendering" dyes were studied, and the tendering activity of the latter could be related directly to the ability of a photoexcited dye to extract a hydrogen atom from a suitable donor (e.g. cellulose). The cellulosic free-radical thus formed could then undergo a reaction with oxygen resulting in a tendering due to oxidative scission. Flash photolysis and rigid glassy solvent spectroscopy were applied to various intermediates formed in the "tendering" reaction. Certain of these intermediates were identified, and in certain cases their kinetics were studied. The theoretical significance of this work, and the differences between tendering and non-tendering dyes were discussed.

The second paper, **Grafting onto Cellulose and Cellulose Derivatives by the use of Ultraviolet Irradiation,** was the joint work of N. Geacintov, V. T. Stannett and E. W. Abrahamson, and was reported by Dr. Geacintov. The cellulose tendering properties of disodium 2,7-anthraquinone disulfonate were used in grafting various vinyl monomers onto cellulosic materials. A film of cellophane, or of some cellulose derivative, was suspended in a mixture of the appropriate monomer, solvent, dye and water, and then irradiated with a mercury vapor lamp. The photoexcited dye removed a hydrogen from the cellulose, and initiated vinyl homopolymerization with the formation of a graft polymer. Such grafted films showed totally different characteristics (such as solubility) from those of the original cellulose. Concentrations of the monomer and the length of the irradiation period governed the degree of grafting. When air was bubbled through the original mixture both homopolymerization and grafting were inhibited. Various monomer-solvent systems were used in the grafting, and these were discussed.

In the evening, at a banquet, Dean Edwin C. Jahn served as toastmaster, and Dr. Worth Wade, director of patents of the American Viscose Corporation, gave an interesting talk on **The Future of Man-made Fibers in the Paper Industry.** Such fibers are used largely in specialty papers, into which they often enter as blends with other synthetics and with native fibers.

The scientific meeting was resumed on the following day under the chairmanship of Dr. W. J. Roberts, of the Celanese Corporation of America, Summit, N.J. The first speaker was Dr. Kyle Ward Jr., Chief of the Cellulose Group at the Institute of Paper Chemistry. He gave a brief resume on the **Chemical Modification of Papermaking Pulps,** focusing on the developments in the field within the past few years, at the Institute of Paper Chemistry. Although many different types of groups have been introduced into cellulose, the two that were most intensively studied

(Continued on page 182)

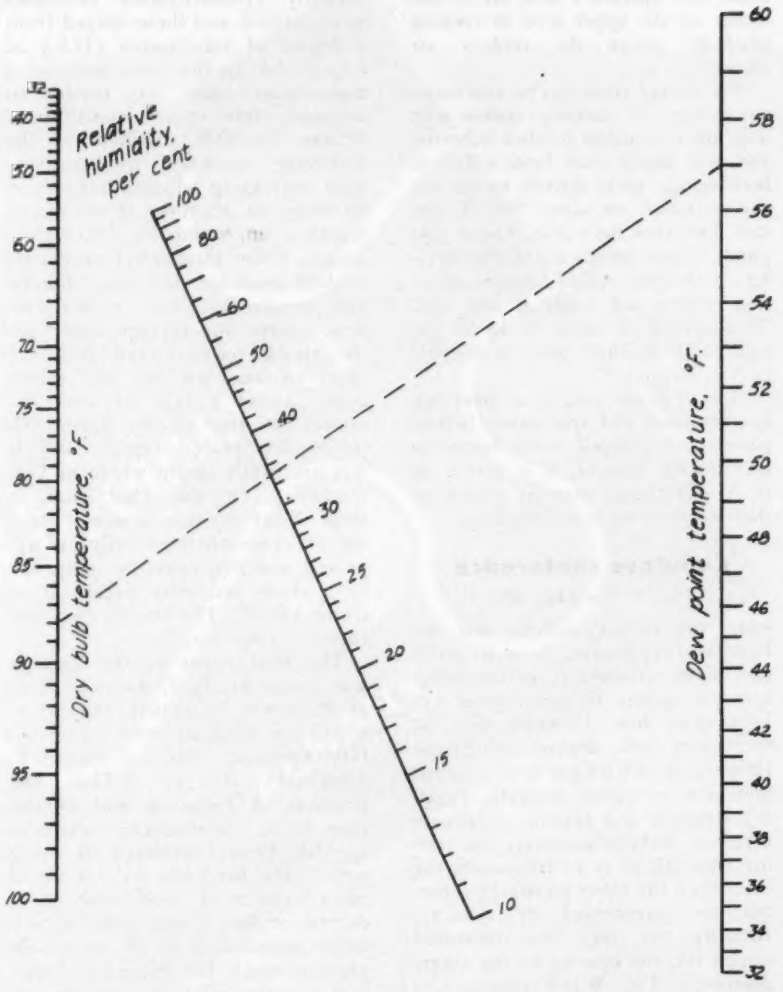
Sweating of Paper

D. S. DAVIS

Head, Department of Pulp and Paper Technology
University of Alabama

WHEN SKIDS OR ROLLS of paper are moved from a storage room where the temperature is low to a room where the temperature is higher, moisture will condense on the surface of the paper unless the relative humidity in the warmer room is below a certain value. The nomograph, which was constructed through application of methods previously described (1), enables one to determine the critical value of the relative humidity.

The use of the chart is illustrated as follows: Paper stored at 57° F. is moved into a room where the temperature is 88° F. What is the maximum percentage relative humidity that can be tolerated in the warmer room if 'sweating' is to be avoided? A straight line that connects 57 on the dew point scale with 88 on the dry bulb scale shows, on the slant scale, that moisture will condense on the surface of the paper unless the relative humidity in the warmer room is less than 35 per cent.



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Multiwall bag manufacturing

(Continued from page 172)

Cooking is automatically controlled by Taylor recorder-controllers that chart the time-temperature cycle. A single chart is used for a 24-hr. period. Cooking charts are sent weekly or semi-monthly to the adhesive laboratory of St. Regis at Pensacola. By inspecting the charts, experts at the laboratory can determine if adequate cooking times at correct temperatures have been employed for each batch, and also the volume of production or how many cooks per day are being made of each type paste.

Operated by the adhesive department at Pensacola, which centrally controls all adhesive operations of St. Regis, the laboratory is in contact with the paste departments of all St. Regis plants. The adhesive department at Pensacola is charged with responsibility for development, manufacture, quality and cost of all adhesives used in St. Regis bag plants.

At Franklin, finished cooks are discharged by gravity through gate valves and 3-in. discharge lines. There is a strainer of 2-gal. capacity in each discharge line just before the point of entry into the storage tank. Each strainer consists of a perforated baffle plate with 3/16-in holes mounted inside a vertical cylinder. The strainers are drained periodically from the bottom. The discharge line enters each storage tank at the back near the top.

Storage of cooked paste

Each of the two horizontal storage tanks has a capacity of 1000 gal. Both tanks are rectangular with rounded bottoms. They each have a horizontal gate-type agitator with Morse chain drive and powered by a 1½-hp., 1800-rpm. motor. These agitators turn at 17 rpm., and keep finished paste constantly agitated.

Final temperature of finished paste ready to be pumped from the storage tanks to the machines is likewise automatically controlled. When a cook is dropped into one of the storage tanks, the operator sets a dial on the instrument board to the required temperature. By doing so, he adjusts the temperature of the cooling water circulating in the coils and thus the rate of cooling to get the proper final temperature, which should always be the same for each type paste despite seasonal changes in ambient temperature. Before a batch can be pumped from the storage tank to the machine the temperature gauge on the storage tank should coincide with the dial on the instrument board. The instrument

board and operator's desk are in one corner on the upper level or cooking platform where the cookers are charged.

The storage tanks can be used interchangeably. A pumping system with 2-in. lines circulates finished adhesive, and will pump glue from either or both storage tanks directly to the machines, which are about 500 ft. distant. Each tank has a 2-in. Viking gear pump. These pumps are driven by 3-hp., 1200-rpm. Allis-Chalmers induction motors and rotate at 200 rpm. They operate at about 50 to 55 psi. and pump finished paste at the rate of 5 to 20 gpm.

Since it is not used in as great volume as seam and spot paste, bottom paste is not pumped to the bottomers at Franklin. Instead, it is drawn off in 55-gal. drums that are placed on dollies and taken to the machines.

Cellulose conference

(Contd. from page 180)

were the carboxymethyl- and the hydroxyethyl-groups. So as to maintain water insolubility of the cellulose, the degree of substitution was kept quite low. However even at such very low degrees of substitution as 0.03-0.04 per cent, marked increases in tensile strength, bursting strength and folding endurance occurred, without sacrificing the tearing strength as is so frequently the case when the other physical properties are augmented by refining. Actually the tear also increased somewhat; the opacity of the sheets decreased. Dr. Ward proposed a hypothesis to account for the behavior of these slightly modified pulp fibers. The slightly substituted fiber has, as it were, a beater additive actually built into its structure. This results in a more rapid response to beating and the development of greater bonding strength in the sheet. In confirmation of this hypothesis, some of the effects of beater additives were compared with those shown by the chemical modifications alluded to in the outline given.

Dr. Carl M. Conrad and David J. Stanonis, of the Southern Regional Laboratory in New Orleans, presented their work on **Mechanical Properties of Doubled Cotton Yarns Cyanoethylated without Tension.** The paper was read by Dr. Conrad. Cotton yarns, of two-ply medium twist construction, were kept overnight under 6 per cent caustic soda, centrifuged to a 100 per cent "pick-up" and allowed to react with liquid acrylonitrile at 60° C. for various periods, up to 1 hour. In this way partially cyanoethylated celluloses were formed, and these ranged from a degree of substitution (D.S.) of 0.62 to 2.6. In the latter instance, a hydrotropic agent was needed to enhance this high substitution. When the D.S. reached 1, the shrinkage increased progressively with increasing substitution. Upon stressing to rupture, there was a regain of approximately the original length. Other mechanical properties studied included the fiber bundle and yarn-breaking load, tensile stiffness, energy for rupture, and both the elastic recovery and resilience from six and ten per cent extensions. Above a D.S. of 1.10, the crystal structure of the native cellulose disappeared rapidly and it was practically absent when the D.S. reached 2. On the other hand, in these X-ray studies, a new (hazy) arc of cyanoethylated cellulose appeared, and this could be sharpened by a short annealing period at or above 120° C. The results were discussed at some length.

The final paper of the meeting was given by Prof. Eugene Pacsu of Princeton University and represented his work and that of Gerald Hebblethwaite and Robert F. Schwenker Jr., on **6-Thio Derivatives of Cellulose and D-Glucose.** Since the disulfide cross-linkage has been considered as being responsible for some of the useful characteristics of wool, the introduction of such a cross-link into cellulose appeared to be of interest. In previous work, Dr. Pascu had found that 6-tosylcellulose entered into reaction with sodium thiosulfate giving rise to a so-called "Bunte's salt". This on mild hydrolysis yielded a 6-thiocellulose. However in this reaction, the cellulose fabric was tendered. Consequently, in place of the cellulose, a model compound (6-0-tosyltetraacetyl-β-D-glucose) was studied, and the subsequent (rather unusual) reactions of which were discussed.

Green liquor phase separation

(Contd. from page 178)

just with kraft liquor when they tried to operate with the base at too low a value.

There are three other problems involved in the evaporation of the combined liquors. One is that there is present in the neutral sulfite liquor a precipitable lignosulfonate and in addition the neutral sulfite semichemical carries with it considerable quantities of calcium. This is due to the presence, during the cook, of acetic acid and bicarbonate, both of which tend to solubilize calcium in the wood. On top of this and as an added problem, the semichemical liquor contributes a suspension of very fine pulp which will cause evaporation problems.

In our development of this third technique we have stressed (as far as the evaporation of the sulfite liquor by itself) the production of a kraft type liquor to avoid the vapor side corrosion. However, as long as there is some sulfide in the mixed liquors, the sulfide will suppress the vapor side corrosion. The use of the available sulfide from the phase separation to react with the neutral sulfite liquor can be used to produce a liquor which is chemically similar to kraft and gives a very compatible liquor. In addition the treatment has some other advantages. The treatment raises the pH, and even more, it stabilizes the pH because it removes the type of sulfonate which ordinarily is dissociated during the evaporation, lowering the pH during the evaporation. An added advantage is that all the calcium that is present is removed as calcium carbonate during the treatment of reacting the sodium sulfide with the sulfite liquor. As you have to remove the calcium carbonate, the fine pulp comes out with it. In addition, the reaction converts the dissociable lignosulfonate to a hydroxylignin. The treated liquor can then be used with any ratio of kraft and sulfite and regular kraft equipment can be used for the evaporation. Above the ratio of two kraft to one neutral sulfite semichemical all of the regular kraft equipment can be used throughout. Below this ratio, a direct-contact evaporator cannot be used as it would precipitate hydroxylignin.

This is actually then a full recovery system which could be used without the presence of any kraft. The problem of using it without any kraft is simply that attention must then be paid to the corrosion on the vapor side and the liquor must be very carefully and thoroughly reacted so there is no more lignosulfonate which can be dissociated and give vapor side corrosion.

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[5]U. S. Patent No. 2,642,399
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[7]U. S. Patent No. 1,823,519
[8]Novel smelt jetting method and smelt component separation at Nekoosa. Paper Trade Journal, May 7, 1956. R. A. Nugent and R. Q. Boyer.

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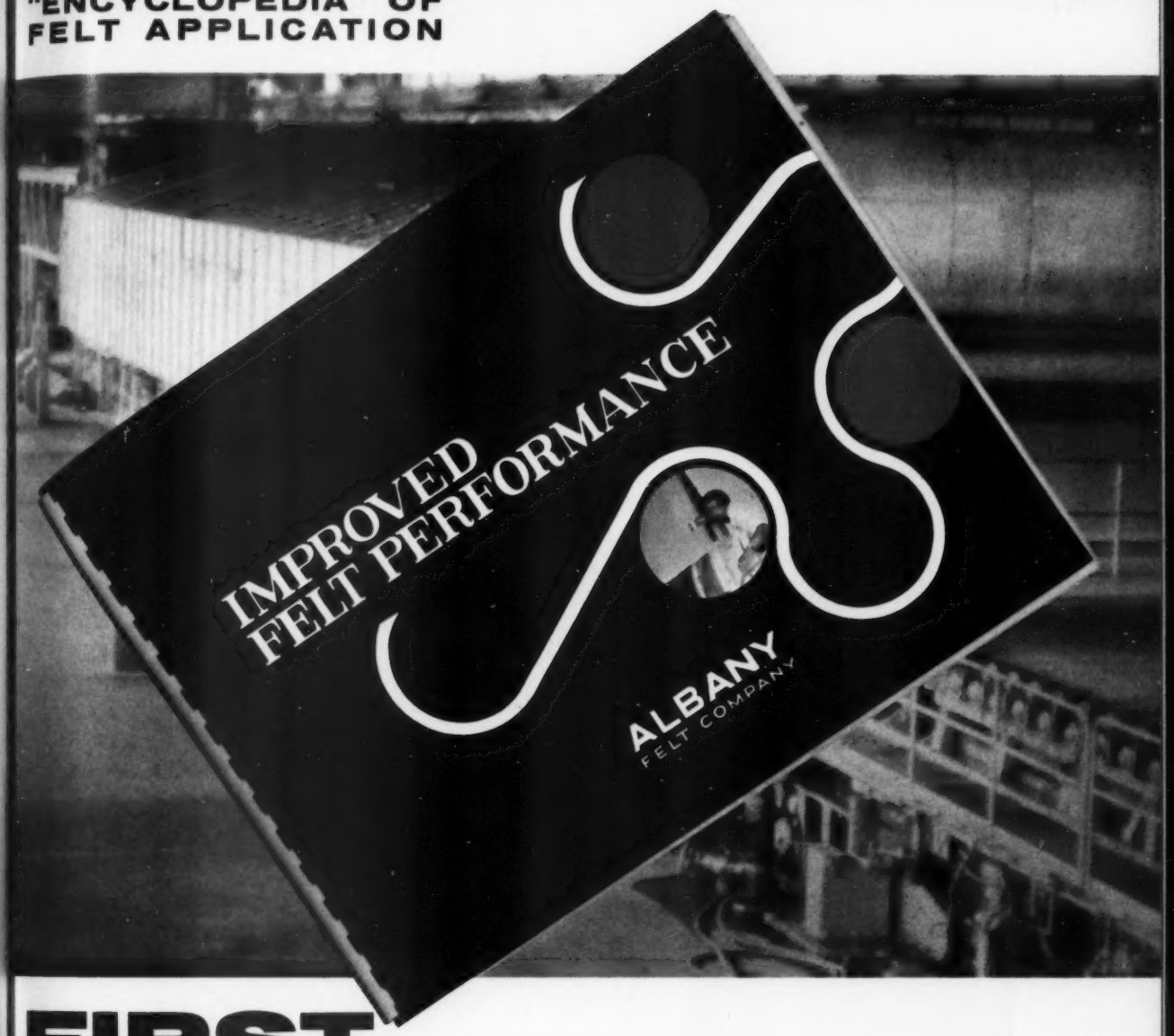

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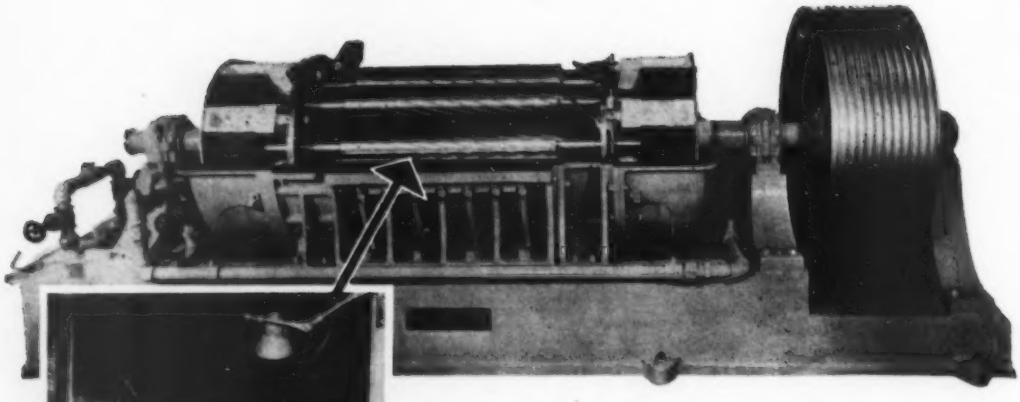

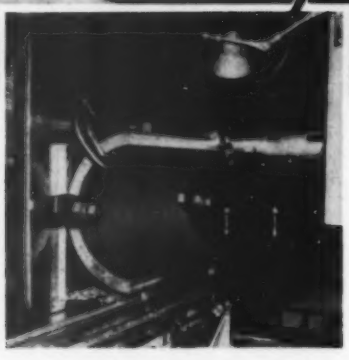

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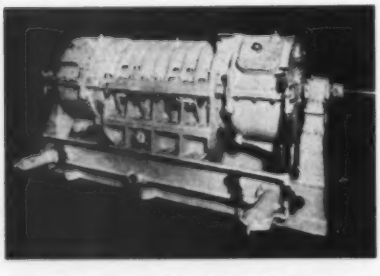

Reject recovery with Anton J. Haug refiners is saving paper mills more than $7 million per year in wood alone! ACIPCO *furnishes tough, durable, stainless steel liners which go inside the main casings of the machines.*

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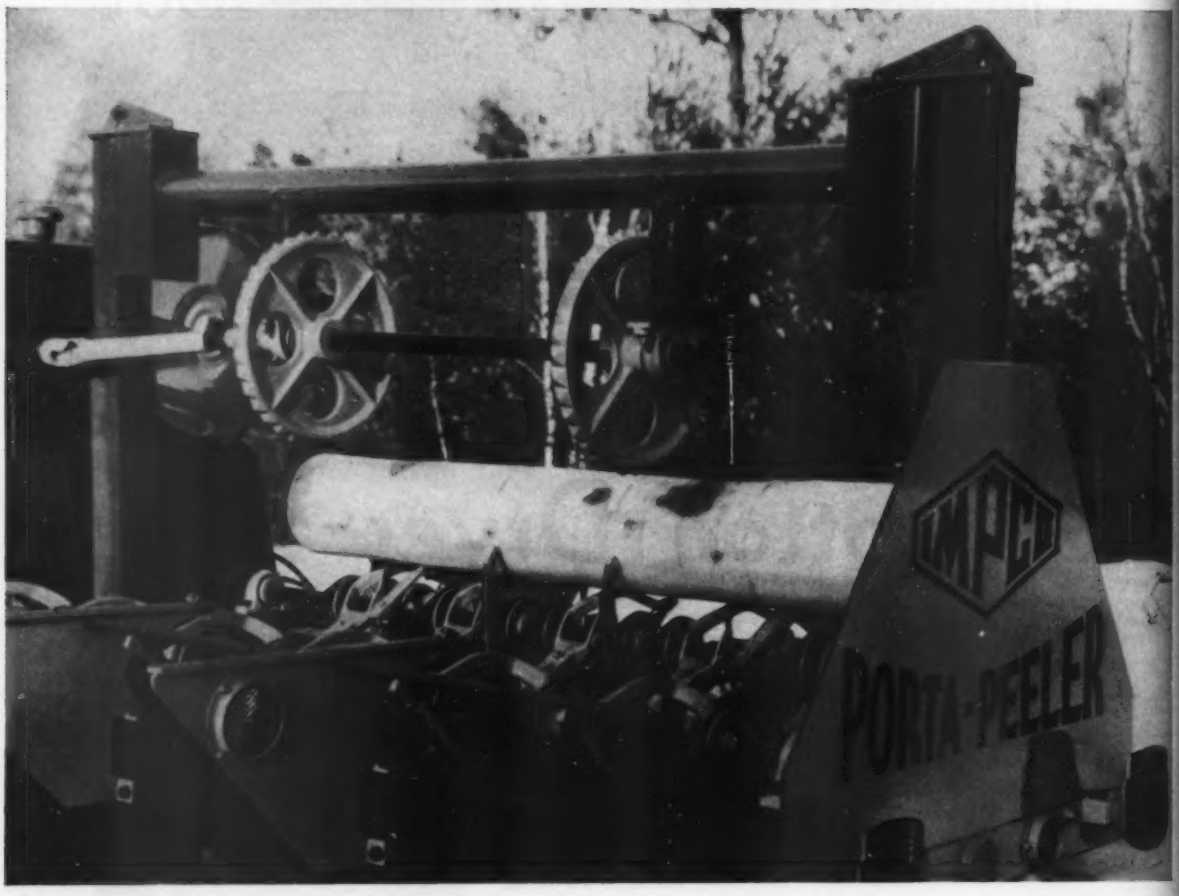

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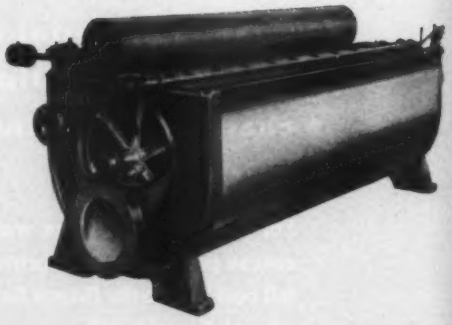

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CURRENT COMMENTS

Returning Prosperity . . . Production increases . . . Results of research

By WARREN B. BULLOCK

The paper industry come-back from the recession of 1957-1958 is almost spectacular. First quarter earnings reports almost unanimously show improvement over the comparable period in 1958, while in some cases the change was startling. For instance, Certain-Teed Products showed a profit of over $600,000 as compared with a loss of $168,000 during the first three months of 1958.

Here are some of the noteworthy evidences of returning prosperity: Rayonier came back so strongly that its 1959 first quarter earnings were over six times the 1958 figure. A smaller concern, National Vulcanized Fibre, was five times its 1958 showing. Other outstanding gains, by no means a complete picture of the industry's advance, are: St. Regis—an increase of over 50 per cent over the 1958 figure; Union Bag-Camp—over 45 per cent; Crown Zellerbach—nearly 30 per cent; Container Corp.—23 per cent; Nekoosa-Edwards—over 60 per cent. It will be noted that the improvement was not confined to the giants of the industry, but carried through the companies of intermediate size down to the smallest.

Comments from industry executives at various company meetings were generally optimistic, though on the conservative side. At the St. Regis meeting, President Ferguson told a stockholder that while the outlook was good, the directors would prefer to gauge the situation for a longer period before restoring the former dividend of 50 cents per share. Asked about the Florida real estate boom, Mr. Ferguson said the company, though not in the real estate business, bought 1400 acres at $150 per acre in 1949 and recently sold 75 acres of the tract for $6000 an acre.

Report to congress

The Department of Justice has made a formal annual report to Congress on trends in the paper industry in which it is stated that there is presently no monopolistic trend in the industry's production of book and magazine papers. Congress requires a periodical report on the effect, if any, which government assistance has had on expansion programs. The Department states: "In the main, supply capabilities now seem adequate to meet publisher need for the near future. Prices, while somewhat rigid, do not appear to be so high as to create a special problem in that respect."

Mutual tariff reduction?

The Council of the European Economic Community has voted its backing for the United States proposal for customs tariff reduction among the various nations which participate in the international reciprocal trade agreement program. Formal approval is also expected at a forthcoming meeting of GATT. If the proposal is adopted, negotiations will start next year for mutual tariff reductions to be effective some time in 1962. The United States is authorized to reduce duties to a maximum of 20 per cent, but until then there will be no change in existing rates.

Production and sales

Industry production in the first quarter of the year set an all-time high total of 8,200,000 tons. Manufacturers sales are reported at a record-breaking rate of $11.6 billion a year.

Paperboard output continues to expand, with a product increase of 22 per cent above that of a year ago.

The improving prospects have led several companies to announce increases in the price of book papers, and in some cases the increase was extended to writing papers. The advance in most cases has been $10 per ton.

In this age of technological advancement and development of new products through chemical research, paper in many cases is becoming something more than paper. The use of melamine resin to form new products is developing almost as rapidly as the use of polyethylene coatings to give new characteristics to basic papers. A typical instance is the use of paper with ceramic designs as a replacement for tissue paper decalcomanias. The new product, patented in the United States, but also made abroad, consists of a decorated impregnated with melamine. This sheet is then fused into the clay base with the resin forming the surface of ceramic article. In the case of the usual ceramic decalomanias the mineral colors are fused in the clay, but the paper carrier is burned away. Another use of melamine resin is found in the importation of paper of a wallpaper grade, carrying designs which, after the decorated sheet is impregnated with the resin, becomes a decorative surface for articles of the Formica type. Domestic producers of impregnating paper for similar use have not proceeded to the production of a decorated base stock.

Current television commercials of an automobile manufacturer are featuring the use of a paper-based fabric as tentage and sleeping bag stock for camping parties. As in the experimental production of paper clothing, the basic paper is reinforced with threads of various fabrics. The Government is experimenting with military uses of this product.

Financial Report

The market for paper mill securities did not share in the surge forward of stocks in the electronic field. On the other hand they did not suffer in any of the recent shaking out of excessive speculation.

Net Incomes

Allied Paper Corp.—First quarter income, $538,829; a year ago, $240,000.

American Writing Paper Corp.—First quarter income, $134,791; a year ago, $134,451.

Bergstrom Paper Co.—Net income for year ended March 24, $725,307; a year ago, $844,418.

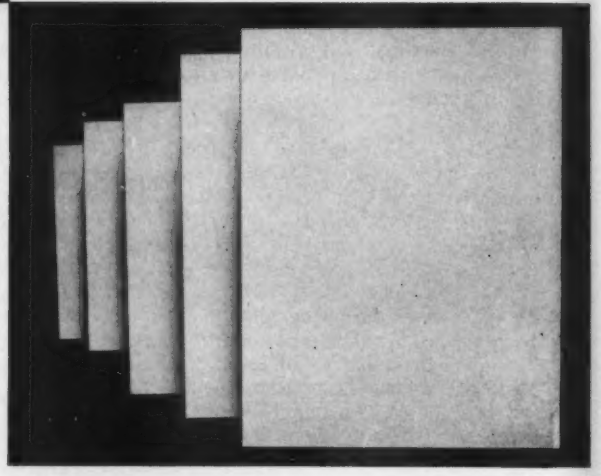
Certain-Teed Products Corp.—First quarter income, $637,825; a year ago, $168,541.

Chesapeake Corp. of Va.—First quarter income, $733,463; a year ago, $571,753.

Container Corp. of America—First quarter income, $4,096,000.

CLEANER FIBERS....

CLEANER PAPER....



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Crown-Zellerbach Corp.—First quarter, $8,311,000; a year ago, $6,489,000.

Federal Paper Board Co. Inc.—First quarter income, $962,000; a year ago, $1,072,000.

Fibreboard Paper Products Corp.—First quarter income, $1,066,379; a year ago, $885,343.

Georgia-Pacific Corp.—First quarter income, $2,750,223; a year ago, $1,932,656. This reflects the company's development of its Pacific coast pulp and paper enterprise.

Hammermill Paper Co.—Income for 13 weeks ended March 29, $528,545; a year ago, $444,038.

Keyes Fibre Co.—First quarter income, $384,155; a year ago, $307,361.

Mead Corp.—First quarter income, $2,669,184; a year ago, $2,373,816.

Minnesota & Ontario Paper Co.—First quarter income, $1,187,473; a year ago, $1,283,205.

National Vulcanized Fibre Co.—First quarter income, $413,400; a year ago, $81,700.

Stock and Bond Quotations

New York Stock Exchange—Stocks

Closing Prices	May 11, 1959	April 10, 1959
American Can	43⅞	44
Same Pref.	38	39⅞
Celotex	41¾	42
Same Pref.	* 191/4-193/4	* 191/2-197/8
Certain-Teed Products	15⅞	14¾
Champion P. & F.	43	45¼
Same Pref.	93½	96½
Chesapeake	35⅜	37
Container	23⅜	26½
Same Pref	* 92-93	* 91-92½
Continental Can	46¾	45¼
Same Pref.	90	91
Crown Zellerbach	55	55⅞
Same Pref.	94½	* 97-98
Diamond-Gardner	30¾	34⅞
Same Pref.	—	32¼
Federal Paperboard	50	47
Same Pref.	22	22⅜
Fibre Paperboard	52⅜	54
Great Northern	51	49¾
Hammermill	30¾	32¾
International	112	117¾
Same Pref.	* 90-92	91¾
Kimberly-Clark	62¾	60½
McAndrews & Forbes	30	30⅜
Masonite	43½	43⅜
Mead	45	47
Same Pref.	92⅛	* 94-97
Minnesota & Ontario	34¼	33¾
Oxford	37	33
Same Pref.	97	* 95-97
Rayonier	24⅛	27
Riegel	34⅜	36
St. Regis	48	47⅞
Same Pref.	* 95¼-97½	* 97-98
Scott	80	80¾
Same $4 Pref.	* 90-91½	* 93-95
Same $3.40 Pref.	* 80-81	* 80-82
Sealright	40¾	* 41¾-42¾
Standard Packaging	32½	3[illegible]
Same $1.60 Pref.	97	92¼
Same $1.20 Pref.	35½	32½
Sutherland	46	42
Union Bag-Camp	44½	49¼
United B. & C.	34	37½
United Wallpaper	9⅞	9⅛
Same Pref.	18¼	* 191/2-197/8
U. S. Gypsum	108¼	104
Same Pref.	*156¼-158	158
West. Va.	42½	47½
Same Pref.	* 96¾-98	* 98-100

New York Stock Exchange—Bonds

Champion P. & F. 4¾%	114	116
Champion P. & F. 3¼%	93½	—
Diamond Gardner 3%	—	—
Kimberly-Clark 3%	93½	93
Mead 3%	—	—
Oxford 4¾%	112	111
Scott 3%	108½	112⅛

American Stock Exchange—Stocks

Allied Paper	12¾	13¼
American Writing	35¼	33
Brown	13⅜	14
Puget Sound	23	23⅞

*Closing Bid and Asked Prices

NEW 2" TO 3⅜" CENTER

HYGRADE WORM GEAR SPEED REDUCERS

⅓ TO 5 HORSEPOWER INPUT

Plus Features for Plus Service

Now—Foote Bros. offers the longer service life, greater capacity-for-size, more compact design and extra quality of famous Hygrade Reducers in 96 new combinations.

Advanced worm gear design and Foote Bros. precision production techniques make these new Hygrade Reducers the most efficient and economical power packages you can buy. And they're easier to select and buy, because Foote Bros. Distributors and Branch Warehouses carry them in stock ready for immediate delivery.

IN STOCK at Your Nearby FOOTE BROS. Authorized Distributor

Write for Stock Products Catalog

100 YEARS 1859-1959 FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION

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THE *Pulp* YOU NEED

Where YOU NEED IT

When YOU NEED IT

A promise kept faithfully at Weyerhaeuser's Everett, Washington mill. This accounts for the round-the-clock operation that sends an endless chain of freight cars from coast to coast — to satisfy the demand for uniform quality pulp.

Today, all of Weyerhaeuser's modern mills stand ready to satisfy every request for:

- *Standard Bleached Sulphite*
- *Hardwood Bleached Sulphite*
- *Absorbent Alpha Bleached Sulphite*
- *Regular Bleached Kraft*
- *CD (Chlorine Dioxide) Bleached Kraft*
- *Soft Bleached Kraft*

PULP DIVISION

WEYERHAEUSER

DOW | **SARAN LINED PIPE**

Saran Lined Pipe carries 140°F. Sulphuric Acid . . . resists shock, temperature changes, corrosion

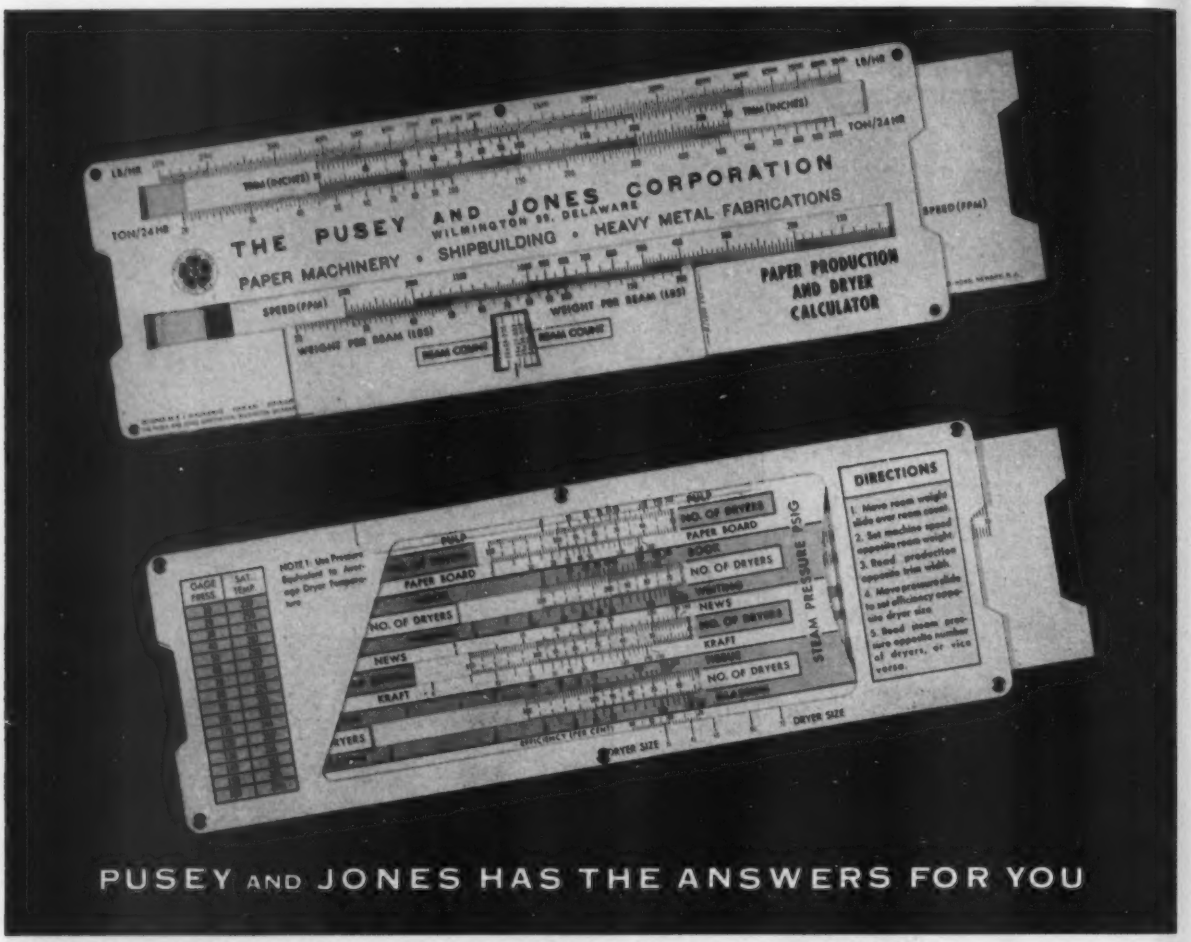
When a leading paper manufacturer needed a dependable pipeline to carry hot, strong acid waste from its chlorine dioxide bleach plant to a distant kraft recovery system . . . when the pipe had to withstand severe thermal shock, and require a minimum of support and maintenance . . . Saran Lined Pipe was specified as the best answer on all counts.

The Nekoosa, Wisconsin, plant of Nekoosa-Edwards Paper Company installed the chlorine dioxide bleach plant two years ago. Acid waste from the reactor consists of sodium bisulfate dissolved in 35% concentration sulphuric acid. This highly reactive solution enters the Saran Lined Pipe system at 140° F., to be carried to the kraft pulp mill recovery system where both sulphur and sodium are ultimately recovered. The pipeline traverses work areas and pipe tunnels, often being inaccessible for repair and maintenance, and in places is exposed to outside temperatures which can range well below zero in winter.

Because of its extreme corrosion resistance and high physical strength . . . despite conditions of high chemical reactivity, and of thermal and physical shock . . . Saran Lined Pipe continues to perform well for Nekoosa-Edwards, providing completely dependable, maintenance-free performance.

Saran Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, from below zero to 200° F. They can easily be cut, fitted and modified in the field without special equipment. For more information, write Saran Lined Pipe Company, 2415 Burdette Avenue, Ferndale, Michigan, Dept. 2287DN6.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN


THE PUSEY AND JONES CORPORATION
WILMINGTON 99, DELAWARE
PAPER MACHINERY • SHIPBUILDING • HEAVY METAL FABRICATIONS
PAPER PRODUCTION AND DRYER CALCULATOR
DIRECTIONS
STEAM PRESSURE PSIG
DRYER SIZE
PUSEY AND JONES HAS THE ANSWERS FOR YOU

With Pusey and Jones' new free Calculator you can do a fast, accurate job of figuring ream counts, dryer size, type of paper and other mill data.

Just fill out the coupon—it will bring you Pusey and Jones' new Paper Production and Dryer Calculator—a new kind of slide rule that will save you many hours in your day-by-day mill operations.

It's easy to use, sturdily constructed and convenient—measures only 9½ inches by 3⅛! Not for sale anywhere, it's available *only* from the first company in the United States to specialize in the design and manufacture of paper-making machines. See a Pusey and Jones representative or write direct.

What you can do* with PUSEY AND JONES' NEW PAPER PRODUCTION AND DRYER CALCULATOR:

Figure This:	When You Know:
Daily and hourly production	Ream weight and count, speed and trim
Equivalent ream weight	Both ream counts
Speed	Desired production, any ream weight-count combination and trim
Number of dryers needed in a new machine	Weight, ream count, speed, type of paper and steam pressure
Dryer efficiency in your present machine	
Extra dryers or increased steam pressure required in rebuilding for greater production, change of speed, different weight or conversion to another type of paper	

**At least 8 different calculations can be made quickly and easily. Above calculations may be reversed or altered depending on knowns and unknowns.*

Please send one of your new Paper Production and Dryer Calculators.

NAME _____

POSITION _____

COMPANY _____

STREET ADDRESS _____

CITY _____ ***ZONE*** _____

STATE _____

THE PUSEY AND JONES CORPORATION

WILMINGTON 99, DELAWARE

NEWS of the INDUSTRY

AIM Announces Top Companies for 1958

The American Institute of Management Inc. of New York has announced the names of companies which it has certified to be "excellently managed".

These citations are based on the Institute's continuing analysis of corporations in the United States, Canada and Europe. They are designed to bring deserved recognition to those companies whose managements are doing most to increase productivity, with accompanying benefits to employees, shareholders, their plant communities and to the economy as a whole.

In the paper, pulp and allied products industry group, AIM has selected the following companies: Brown Co.; Champion Paper & Fibre Co.; Crown Zellerbach Corp., Fibreboard Paper Products Corp.; Great Northern Paper Co.; Hammermill Paper Co.; Hinde & Dauch Co. of Canada Ltd.; International Paper Co.; Kimberly-Clark Corp.; Mead Corp.; Olin Mathieson Chemical Corp.; Powell River Co. Ltd.; St. Regis Paper Co.; Scott Paper Co.; Sutherland Paper Co.; Union Bag-Camp Paper Corp.; West Virginia Pulp & Paper Co.; and Weyerhaeuser Timber Co.

Gardiner Experiments with Shoe Products

Gardiner Paper Mills Inc. of Gardiner, Maine, is currently experimenting with various impregnated shoe products.

Robert E. Kinsey, general manager of Gardiner, stated that impregnated heel and innersole materials are the principle items now being tested in the mill. These tests are part of the firm's new diversification program.

Buckeye Reveals New Findings on Pulp Structure

Karl A. Jurbergs, a research chemist at Buckeye Cellulose Corp., has reported details concerning the electron microscopic research on fiber morphology that was carried out at Buckeye.

As a result of these new discoveries in fiber structure, increased flexibility in tailoring dissolving pulps to specific end uses will now be possible. Jurbergs stated that the findings have added significantly to present fiber knowledge and have cleared up some of the controversies concerning fiber structure.

Research Program Planned

The Institute of Paper Chemistry is planning a new program of pioneer research for the pulp and paper industry.

The program will be sponsored by pulp and paper companies on a voluntary basis. David Luke, vice-chairman of the board of trustees of the institute and president of the West Virginia Pulp & Paper Co. of New York, said that companies will have to commit themselves to support the program for five years.

Research grants will be distributed to universities and laboratories regardless of location.

Wisconsin Receives Gift of 20,000 Acres

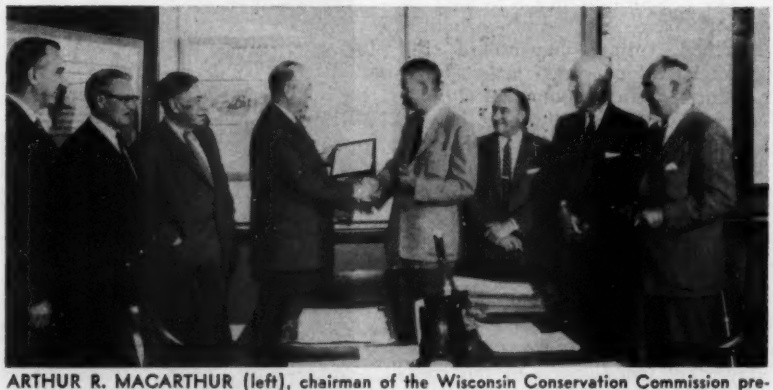
Consolidated Water Power & Paper Co. of Wisconsin Rapids has presented their 20,000-acre holdings in the valley of the Little Eau Pleine River in Wood, Marathon and Portage counties of Wisconsin to the State of Wisconsin Conservation Department.

The gift was given to the state by Stanton W. Mead, president of the company, for wildlife conservation purposes.

Consolidated has been buying lands in this valley for almost a quarter of a century with the ultimate objective of creating a huge reservoir to supplement water on the lower Wisconsin River during low flow periods. Handicaps associated with land purchases caused a postponement of this project. Realizing the value of the property to the people of Wisconsin for wildlife conservation purposes, the company chose to offer the area as a gift to the state.

The 20,000 acres will be known as the George W. Mead Wildlife Area. With scientific management, bigger crops of fish and game will result. A program of flowage development, clearing, burning, seeding, etc. will bring the area into maximum production.

In presenting the gift, Mead commented that Consolidated would continue to have a high interest in the management of the area and expressed a desire to assist the Conservation Department in whatever manner possible in future management programs.



ARTHUR R. MACARTHUR (left), chairman of the Wisconsin Conservation Commission presents a gift certificate to Stanton W. Mead (right) in acknowledgement of the 20,000-acre gift to the state of Wisconsin. Other members of the Conservation Commission (from left to right) are: L. P. Voight, Russell D. Stouffer, Charles F. Smith, Leonard J. Seyberth, Dr. A. W. Schorger and Guido R. Rahr.

THOMAS B. McCABE (standing), president of Scott Paper Co., Chester, Pa., was the principal speaker for the University of Maine's Open House and Research Days program. The program included two days (May 1-2) of student demonstrations of research projects. Others seated at the banquet table were, left to right: Professor John Gorman; Professor Andrew Chase; Albert D. Nutting, forestry school director; Professor Lyle C. Jenness; J. L. Ober, president of the U. of M. pulp and paper foundation; Dean Weston S. Evans; Professor Harry Watson; Professor Charles Howell; Professor Stefan Zieminski; and Guy Durgin, travelling secretary for the foundation.

Scott Paper Offers Student Edition of Annual Report

A special Student Edition of Scott Paper Co.'s 1958 annual report has been published and will be offered to colleges and universities through the nation.

This edition was prepared for use in courses of business and economics to provide students with an explanation of a corporate annual report in everyday language, in order to promote a better understanding of business operations and their significance in the general economy.

The design of the edition includes the regular annual report accompanied with specially annotated pages which are keyed to the text and figures of the report. Special attention is devoted to the consolidated financial statement.

Aid to education is necessary

The program of educational aid began more than 30 years ago with Scott Paper and has been steadily expanded. The Scott Paper Co. Foundation provides scholarships in twenty leading colleges for the benefit of young men and women of outstanding ability. As a part of this program, Scott also offers summer employment to recipients of the scholarships.

Company employees who wish further schooling may receive up to 100 per cent of the tuition for evening and correspondence school courses through the Scott Educational Refund Program. The company also pays $100 toward the college tuition expenses of any son or daughter of a Scott employee eligible under the Student Aid Plan.

Another program that sends executives and other key personnel for special courses at selected colleges has proven to be of great value in developing men to handle greater responsibilities. Scott has interchanged management representatives and faculty members with a prominent university, and the company encourages professors from schools of business administration and technical institutions to act as consultants on various phases of the company's operations.

Thomas B. McCabe, president of Scott Paper Co., stated: "It becomes more and more necessary for industry to give as much support as possible to both the student and the college . . . . Programs such as these have become increasingly accepted as industry's responsibility. They help to provide the continuing reservoir of capable, well-trained manpower so essential to the future development of our great country".

Recent Expansions in the Industry

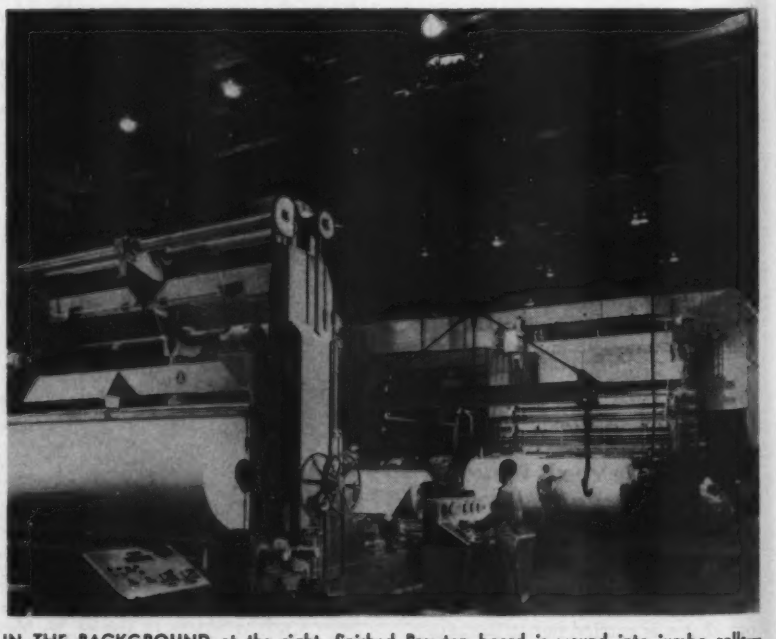
Container's Brewton Plant in Full Production

The Brewton mill of Container Corp., which was completed about a year and a half ago, is now in full production and is operating on a schedule of three shifts a day, seven days a week.

The $30-million mill is located on a 5000-acre site and produces bleached sulfate paperboard for packaging food and many other products. Using about 4000 cords a week, it produces 300 tons a day.

Pines and hardwood from individual timber growers in Southern Alabama and West Florida supply the mill with wood.

The mill's paper machine room is 760 ft. long and 85 ft. wide and contains the Brewtonian—Container's largest paper machine. The mill itself is one of the newest and most important installations in the company's coast-to-coast packaging organization that now include 70 production facilities in 23 states.



IN THE BACKGROUND at the right, finished Brewton board is wound into jumbo rolls—196 in. wide and weighing up to 18 tons. In the foreground at the left, is the rewinder which slits and trims the jumbo rolls to meet specifications of Container's customers.

Mead Acquires Two New Locations

An agreement has been signed for the acquisition of a new, 38-acre industrial location in Louisville, Ky., which will be the new location for the Louisville Div. of Mead Containers Inc.

Present facilities were found inadequate due to expanding markets. Present plans indicate that Mead will relocate existing equipment at its Louisville Div. to the new location within a short time, install a corrugator and allied equipment within the near future and maintain the remainder of the acquired property for future expansion.

A large manufacturing plant located in the heart of the Oakley industrial community near Cincinnati has also been acquired for Mead's New Product Development Div. This division has been experimenting on numerous new uses for paperboard products. The new plant will provide the much needed laboratory space to further its program.

$300,000 Plant to Process Lignin Liquor

Barcon Inc., a recently-organized firm owned jointly by Consolidated Water Power & Paper Co. of Wisconsin Rapids and Magnet Cove Barium Corp. of Houston, has developed a new processing plant in Appleton.

The new plant will convert concentrated lignin liquor into useful products in a dry, powdered form. The products will then be marketed by Magnet and Consolidated.

$25 Million Expansion Planned for International

An estimated $25 million has been planned for expansion at the Ticonderoga plant of International Paper Co.

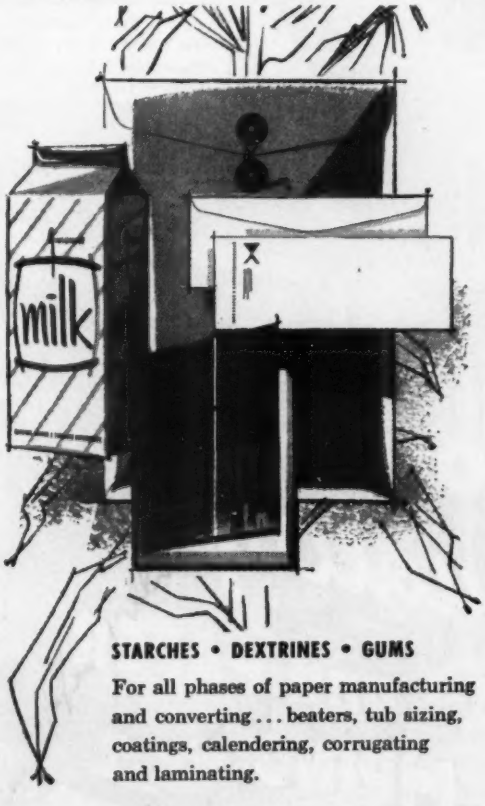
The expansion includes a two-story building to house machinery used in making business paper. The machinery alone is reported to total $14 million.

Martin Paper Opens New Plant

Martin Paper Products Ltd. has opened its new plant in Regina, Sask, for manufacturing corrugated containers.

A custom-designed, 78-in., double-decked Langston corrugator is a main feature in the plant. In a single operation, the machine can form the flutes, apply adhesive and combine the outer facings to deliver an

Look what happened to the corn we took off the cob



STARCHES • DEXTRINES • GUMS

For all phases of paper manufacturing and converting... beaters, tub sizing, coatings, calendering, corrugating and laminating.

ANHEUSER-BUSCH, INC.

BULK CORN PRODUCTS DIVISION

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CAMBRIDGE, MASSACHUSETTS 111 Sixth Street
KALAMAZOO, MICHIGAN 1122 Royce Avenue
SAN FRANCISCO, CALIFORNIA 1485 Bay Shore Boulevard
DAYTON, OHIO 629 Storms Road

COLUMBUS, GEORGIA, 2319 Hamilton Road
ST. LOUIS, MISSOURI, 721 Pestalozzi Street
PHILADELPHIA, PENNSYLVANIA, Bourse Bldg.
NEW ORLEANS, LOUISIANA, 314 Girod Street
LaGRANGE, GEORGIA, 506 Springdale Drive
CHICAGO, ILLINOIS, 750 S. CLINTON
SPARTANBURG, SOUTH CAROLINA, 731 Crestview Drive

unbroken sheet of corrugated board. Production up to 132,000 sq. ft. of corrugated board per hour will be achieved at the plant.

Lloyd E. Angle is manager of the plant and Phillip T. Cook is serving as production manager.

New Corrugated Container Plant

Hygrade Containers Ltd., a subsidiary of Canadian International Paper Co. will build a corrugated container plant in St. John's, Nfld. The plant is said to be in operation by early summer.

New Boiler at Mead

The Sylva, N. C., division of Mead Corp. is now prepared for the erection of a new steam plant for the paperboard mill. Costing over $1 million, the construction and installation is expected to be completed in January 1960.

Babcox & Wilcox has fabricated and will install the new boiler. The boiler is designed to replace six older boilers that now supply the mill's steam requirements. However, one of the present boilers will be converted to burn bark from the wood used at the mill.

The new boiler will generate 200,000 lb./hr. of steam at 600 psi and 740° F. Provisions have been made so that the boiler can also be operated at 850 psi if it becomes desirable to generate electric power.

Du Pont to Build New Plant

E. I. du Pont de Nemours & Co. Inc. will begin this month on a second plant for the manufacture of Mylar polyester film. The plant will be located in Florence, S. C., and will cost almost $20 million.

Commercial production of Mylar film started at the company's Circleville, Ohio, plant in July 1954. The new plant in Florence will almost double the capacity for this film and will provide a second source of supply to eastern markets.

Armstrong Plans Expansion

Armstrong Cork Co. of Macon, Ga., is now making plans for expansion of its facilities. A new fabricating building containing 88,000 sq. ft. of floor space and a new warehouse containing 144,000 sq ft. will be erected. Both buildings will be completed and in use by mid-1960.

The new facilities are being added to provide sufficient production and warehousing capacity to meet the demand for Armstrong's fiberboard ceiling products.

New Plant for Brown Co.

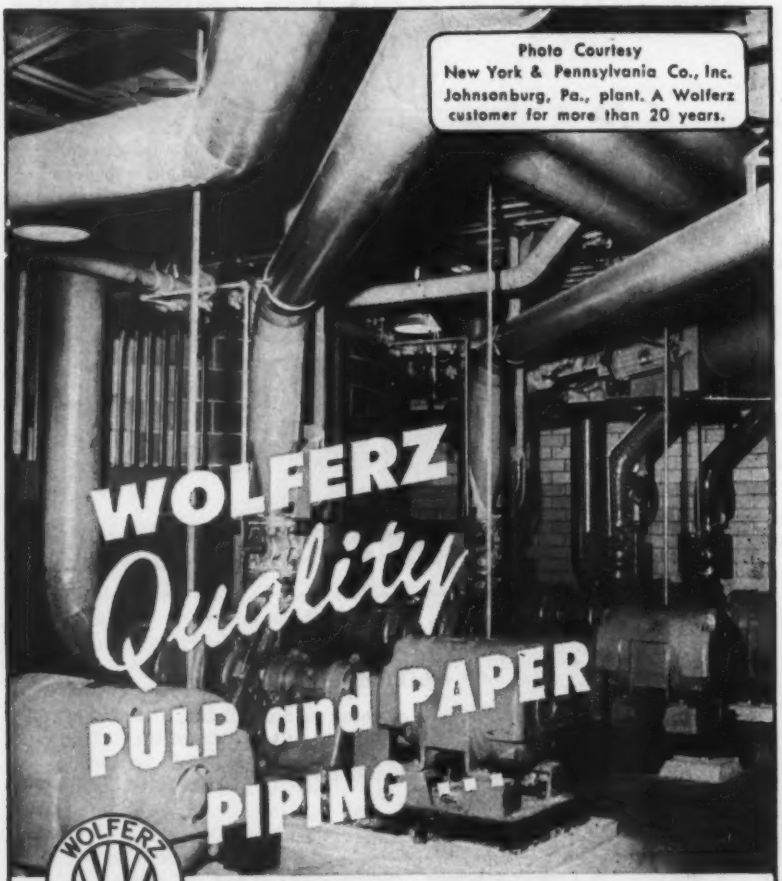
Brown Co. has begun construction on its new Bermico plant on the outskirts of Birmingham, Ala. This plant will be about the same size as Brown's Corvallis, Ore., Bermico plant and is expected to be completed late this year.

Fibreboard Plans Expansion

Plans have been revealed for a multi-million-dollar expansion of the San Joaquin, Calif., pulp and paperboard mill of Fibreboard Paper Products Corp.

President William L. Keady stated that construction of the kraft pulp and paperboard mill will start immediately. It will be located adjacent to the present paperboard-producing units at San Joaquin.

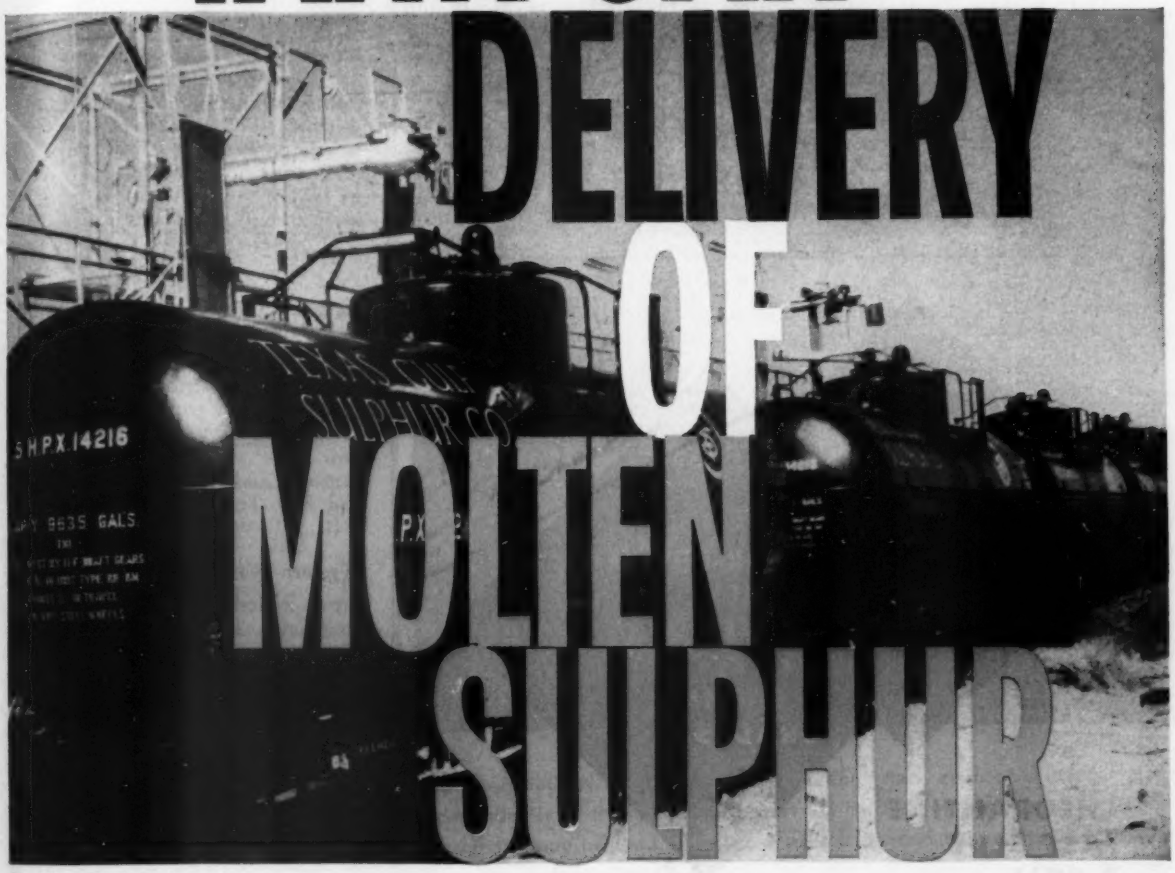
A third paperboard machine and additional raw material handling equipment will add 72,000 tons initially to the annual capacity of this mill, bringing the total yearly



Is used in hundreds of mills where quality material, stainless steel or alloys, are specified. Wolferz Standard Stainless Pipe and Tubing is only part of our quality service to pulp mills. Head Boxes, Suction Boxes, Starch Mixers, Color Tanks, Agitators, Savealls, Storage Tanks, Pipe Fittings and Flanges can be supplied. Equipment furnished in all grades of Stainless Steel and other alloys.

E. C. WOLFERZ ALLOY EQUIPMENT
20 PARK STREET, BELLEVILLE 9, N. J. Tel.: PLymouth 9-5667

TANK CAR DELIVERY OF MOLTEN SULPHUR



Loading Tank Cars at one of our mines

...an important phase of TGS Service

This is a service of interest to the rapidly increasing number of companies preferring to receive their sulphur deliveries in molten form so that they can transfer directly from cars into consumption. We are equipped now to deliver molten sulphur by tank car from all mines and recovery plants to any place in the country. Detailed instruction sheets and drawings are available on request for those in the planning stage or who do not have adequate or proper facilities for handling and storing molten sulphur.

TEXAS GULF SULPHUR COMPANY
75 East 45th St., New York 17, N. Y. / 811 Rusk Ave., Houston 2, Texas

Sulphur Producing Units: Newgulf, Texas • Spindletop Dome, Texas • Moss Bluff, Texas • Fannett, Texas • Worland, Wyoming •

News of the Industry . . .

capacity to over 200,000 tons.

The new fourdrinier machine will make kraft linerboard for use in the manufacture of corrugated shipping containers at the four West Coast container plants.

Kimberly-Clark Corp. of Canada Ltd.
has started operations in its new St. Hyacinthe, Que., converting mill. The new plant will turn out Kleenex tissue and Delsey bathroom tissue, with additional product lines being planned.

Bergstrom Paper Co.
has announced plans for construction of a new warehouse adjoining its finishing plant in Neenah, Wis. The warehouse will be on the west side of the converting plants and will provide 40,000 sq. ft. of storage. Completion is scheduled for next fall.

Flintkote Co.
has leased a 53,000-sq.-ft. building in Marion, Ind. This building will be a sheet plant to produce corrugated containers used by the electrical, glass, food, drug, beverage and paint industries.

Crown Zellerbach Canada Ltd.
has recently completed its new $300,000 corrugated paper box plant located at Kelowna.

E. B. Eddy Co.
has completed work on its new Yankee paper machine. Over $3.7 million were spent on this project. Another $1 million was spent in 1958 to complete expansion of pulp and steam capacity. In 1959, the company will spend $4.8 million bringing its $20 million capital program to near completion.

Southwestern Paper Co.
of Dallas, Texas, has occupied a new 40,000-sq.-ft. office and warehouse building. A distributor and manufacturer of fine paper for the graphic arts industry, Southwestern will now have a capacity to serve the printers and publishers of North and East Texas.

Western-Waxide Paper Div.,
Crown-Zellerbach Corp., San Leandro, Calif., has installed a complete Egan polyethylene coating machine for the production of packaging papers. The machine will handle lightweight papers, foil and cellophane and other films at web widths up to 54 in. and at speeds up to 1000 fpm.

Appleton Coated Paper Co.
of Appleton, Wis., will construct a multi-purpose building at an estimated cost of $350,000. The building will be an extension of the present sorting room and will link the two finished goods warehouses. Completion is scheduled for next fall.

Carton Craftsmen Inc.
of Chicago, is erecting a 37,000-sq.-ft. addition to its facilities for warehouse purposes. The company manufactures folding cartons.

Marathon Southern Corp.,
a division of American Can Co., will begin construction of a third paper machine facility at its Naheola, Ala., mill. The machine will produce a wide range of paperboard for food packaging materials and similar products. The design and construction for this expansion will be per-

(Continued on page 231)

CHLORANTINE® FAST BLUE P-8GLL

Mill usage of this bright attractive color in bond, offset, mimeo and manifold grades produced from bleached sulphite, bleached neutral sulphite semi-chemical and bleached sulphate pulps has repeatedly shown marked economy in formulations for blue and green shades.

Chlorantine Fast Blue P-8GLL is somewhat greener in shade than our Direct Brilliant Sky Blue P-6B Ex. Conc. Its shade and strength permit partial replacement of the more expensive Alizarine Sapphire Blue types to effect appreciable economy without undue loss of brilliance.

Chlorantine Fast Blue P-8GLL possesses excellent light fastness, good fastness to water, acid and alkali, and is easily discharged with hypochlorite solutions. It is recommended for dyeing appealing blue shades of good brilliance on specialty converting papers ranging from tabulating card and file folder stocks to facial, facial toilet and napkin tissues.

We shall be pleased to furnish information on mill-proved formulations showing marked cost reduction over dyes in general use for many blue and green shades.

CIBA Company Inc., Paper Chemicals Department
Fair Lawn, New Jersey

Coming Events

Tappi

July 20-31—Eighth Pulp and Paper Statistics Course, Darthmouth College, N. H.

August 17-21—Tenth Testing Conference, Multnomah Hotel, Portland, Ore.

September 9-11—Fundamental Research-Wet Strength Conference, I.P.C., Appleton.

September 15-17—Ninth Corrugated Containers Conference, Jung Hotel, New Orleans.

September 21-23—Fourteenth Paper Plastics Conference, Edgewater Beach Hotel, Chicago.

October 7-9—Fourth Deinking Conference, Roger Smith Hotel, Holyoke, Mass.

October 12-15—Fourteenth Engineering Conference, Penn-Sheraton Hotel, Pittsburgh.

November 4-7—Thirteenth Alkaline Pulping Conference, Robert Meyer Hotel, Jacksonville, Fla.

Superintendents Association

September 1-3—New York-Canadian Div., Chanteclerc Hotel, Ste. Adele, Que.

September 9-11—Northwestern Div., Hotel Leamington, Minneapolis, Minn.

September 17-19—Northeastern Div., Poland Spring House, Poland Spring, Me.

October 2-3—Connecticut Valley Div. (joint meeting with new England section of Tappi), Great Barrington, Mass.

October 8-10—Pennsylvania-New Jersey-Delaware Div., Traymore Hotel, Atlantic City, N. J.

October 14-16—Southern and Southeastern Div.'s joint fall meeting, Edgewater Gulf Hotel, Edgewater Park, Miss.

Other Meetings

June 21-July 11—Principles and Practice of Coated Paper Manufacture Coarse, Western Michigan University, Kalamazoo.

June 22-26—Air Pollution Control Association, Hotel Statler, Los Angeles.

June 24-26—Huyck Felt Co.'s Felt Workshops, Rensselaer, N. Y.

June 28-July 3—Thirteenth National Meeting of the Forest Products Research Society, San Francisco.

August 29-September 10—Fifth World Forestry Congress, University of Washington, Seattle, Wash.

September 6-12—Seventh Educational Graphic Arts Exposition, New York Coliseum.

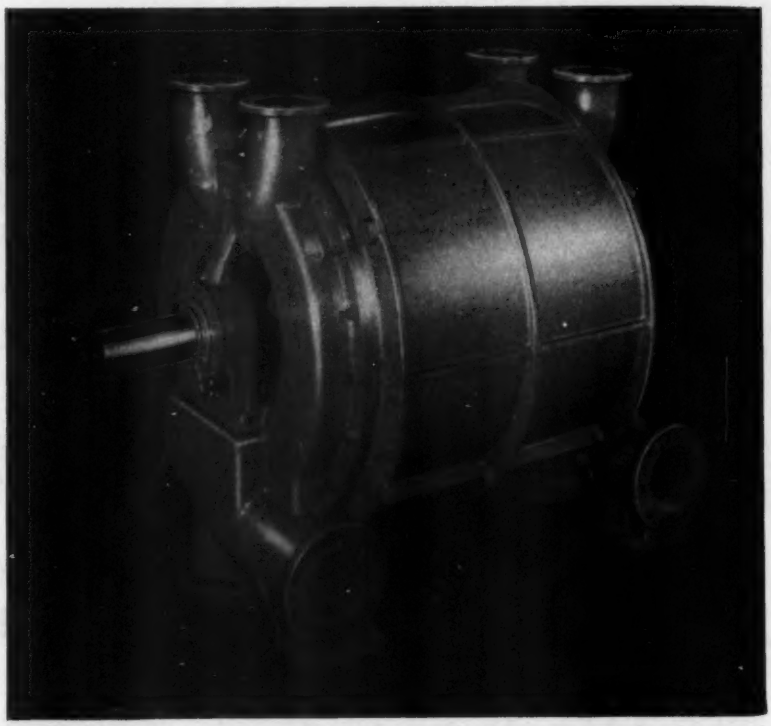
September 10-12—Wood Industries Conference, Portland, Ore.

September 14-16—National Paper Trade Association convention, Conrad Hilton, Chicago.

September 16-18—Huyck Felt Co.'s Felt Workshops, Rensselaer, N. Y.

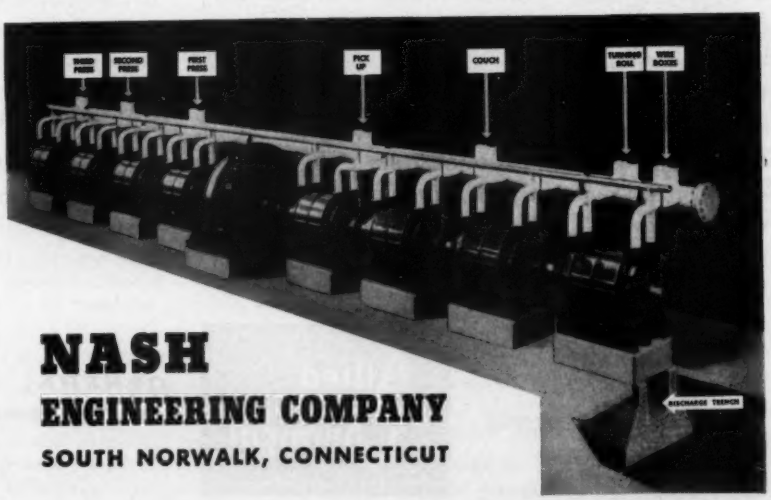
September 20-25—Annual Conference and Exhibit of the Instrument Society of America, Chicago amphitheater, Chicago.

This New Nash Vacuum Pump Offers Four Separate Suctions and Vacuums Simultaneously

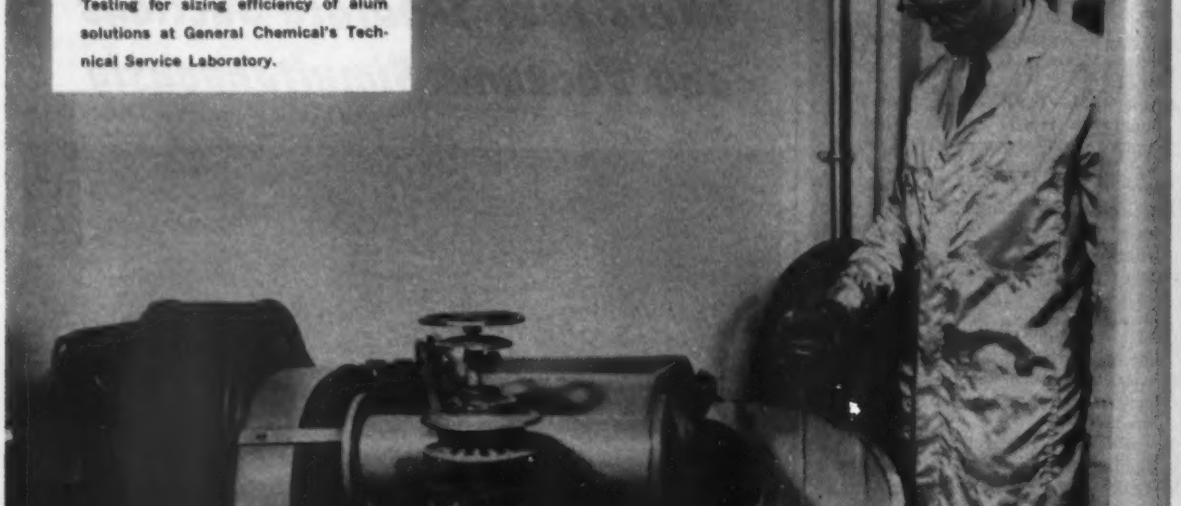


The Nash 5308-A has four separate suction inlets, each of which functions independently of the others. This offers the machine operator great flexibility, since these may be used in any desired combination to produce a variety of capacities and vacuums.

Picture below shows simple drive possible and flexibility of piping permitting capacities to exactly fit requirements of different sections of the paper machine.



NASH
ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT



Testing for sizing efficiency of alum solutions at General Chemical's Technical Service Laboratory.

Another difference in GENERAL CHEMICAL ALUM is TECHNICAL SERVICE

As the country's primary producer of alum, General Chemical is constantly helping customers solve technical problems involving the use of aluminum sulfate. Results? Improved efficiency and reduced operating costs for them.

Here are some of the services our Technical Service Department offers you:

- Supplying basic information helpful in planning design and installation of storing, pumping, metering and feeding facilities.
- Suggesting improvements to eliminate existing storing and handling problems.
- Providing chemists and operators with physical and chemical data necessary for the most effective use of alum.
- Assisting in laboratory tests and plant trials.
- Running check analyses in our own laboratories.

In the paper mill, our specialists advise on the most efficient use of aluminum sulfate for a particular mill's requirements. They can provide assistance on the important conversion from dry to liquid alum, and furnish guidance on the proper design of new installations and selection of materials to avoid handling or maintenance problems. In many instances, chemical problems arise in operations which are not necessarily related to alum. At such times, General's Technical Service continues to offer helpful advice and lend assistance whenever possible.

This kind of Technical Service is one of the reasons why General Chemical is a good company to do business with for *your* mill's alum requirements. We will welcome the opportunity to serve you.

Basic to America's Progress

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

NAMES *in the* NEWS

Ludlow Papers Inc.

Robert C. Hailer has been appointed as advertising and sales promotion manager. His new responsibilities will include not only the Ludlow Co. but also its parent company, Ludlow Mfg. & Sales Co. Both companies are located in Needham Heights, Mass.

Paterson Parchment Paper Co.

R. Lee Buechler has been appointed as general superintendent. He served as assistant superintendent for the past two and a half years.

National Fibre Can & Tube Association

George R. Browner, assistant vice president of Mead Board Sales Inc., was elected president of the National Fibre Can & Tube Association for a one-year term. He succeeds Martin H. Stark, president of Arrow Paper Products Co.

Inland Container Corp.

James O. Harris has been appointed vice president of the company. He has been active at Inland for the past several years in purchasing, quality control and various phases of mill operations. He will continue his present work in the Mill Div., including roll stock procurement, quality control, sales and planning.

Sherman Paper Products Corp.

Kermit Greene has recently been appointed as vice president and assistant general manager of the company's Eastern Div.

Stanley A. Ferbank, director of management engineering, will now hold responsibilities as comptroller of the Eastern Div.

Eino O. Fimlaid, is secretary of the Corporation and will be general corporate comptroller, coordinating financial operations of all divisions.

Norton L. Sherman, who for the past two years has assisted production control in the purchasing of raw materials and supplies, has been appointed director of purchasing for the company's Newton operations.

R. L. Weldon

R. A. Irwin

Bathurst Power & Paper Co. Ltd.

R. L. Weldon, president of Bathurst, has retired after 23 years of service in this capacity. Weldon was also elected to the newly-created office of chairman of the board.

Succeeding Weldon as president will be R. A. Irwin. Irwin joined the company in 1957 as vice president. He was president of Eddy Paper Co. Ltd. and Somerville Ltd. prior to his association with Bathurst.

S. H. Reed

W. H. Boxwell

C. W. Fraunfelter

H. Morrison

Crystal Tissue Co.

Stanley H. Reed, administrative vice president of the company has been elected executive vice president and general manager. Other departmental promotions announced were: W. Homer Boxwell, from purchasing agent to director of purchases; Charles W. Fraunfelter, from St. Louis district representative to assistant sales manager; and Harold Morrison from purchasing department clerk to assistant purchasing agent.

Consolidated Water Power & Paper Co.

William O'Gara has been appointed as assistant production manager of the company's Wisconsin Rapids Division. George Jackson has been named to succeed O'Gara as supercalender and winder superintendent. The appointment of Floyd Eberhardt as cleaning foreman of the Biron Division was also announced.

Roger L. Steel will now be responsible for technical control and product design and development in his new position as technical manager at Consolidated's Ahdawagam Div.

Hugh D. Burnie has been appointed coating department superintendent at the Wisconsin Rapids Div.

Bathurst Power & Paper Co. Ltd.

R. H. Christian has announced his retirement from the office of executive vice president of the company. Having been a director since 1954, he will continue an association with the

Owens-Illinois

Frank Cannon will succeed George S. Harvey Sr. as Eastern regional sales manager for Owen's Multiwall Bag Div.

George R. Zaloudek, staff engineer for Owen's Glass Co. Mill Div., has been named division engineer.

Champion Paper & Fibre Co.

G. A. Jackson has been named director of purchases for Champion Paper. He will succeed Lewis K. Johnstone who was recently named director of a newly-created pulp marketing department.

Richard L. Betts has been appointed to the position of director of contractual relations.

Rayonier Inc.

George E. Scofield has been named general manager of Rayonier cellulose

Mrs. Annie C. L. Fritz

The officers and staff of THE PAPER INDUSTRY magazine of Chicago sadly announce the death on May 10, 1959, of Mrs. Annie C. L. Fritz, vice-president and treasurer of Fritz Publications, Inc., Chicago.

Mrs. Fritz was born of Alonzo and Harriet Mitchell in New Oregon, Iowa, May 25, 1872. Her early years were spent on a farm during which she attended a country school and later received a certificate to teach.

In 1890 after a course at the Metropolitan Business College in Chicago, she applied for apprenticeship on a weekly newspaper in New Hampton, Iowa, and two years later started to work as a typesetter at the firm of W. B. Conkey Co. Chicago. It was here that she met her husband, Edward B. Fritz, who had just arrived from Philadelphia, and the couple were married October 31, 1894. To this union came a daughter, Virginia Fritz Dowd and a son, Wayne Holland Fritz.

In 1899, Mr. Fritz started to work as advertising representative for L. D. Post, publisher of the Paper Mill and Wood Pulp News. Hands, heart and mind of Mrs. Fritz continued their devoted support of him through the years leading to his founding of THE PAPER INDUSTRY in April, 1919.

Mrs. Fritz has been active in the affairs of her business since the death of her husband in 1939. She will be long remembered for the annual awards that she made of the Edward Benton Fritz Memorial Trophy to paper and pulp mills that had excelled in THE PAPER INDUSTRY Safety Contest.

Surviving Mrs. Fritz are a brother, Clyde H. Mitchell of Omaha, Neb., a son and daughter, two grandchildren and three great grandchildren. Her family, friends and associates bear witness of her unselfish and harmonious life. Interment at Marshall, Michigan.

operations. This is a newly-created executive post at Rayonier and will be headquartered at executive offices in New York. Previous to this appointment, Scofield was currently resident manager of the company's Jesup division. Blanton W. Haskell will fill this position at Jesup.

Abitibi Power & Paper Co. Ltd.

C. B. Davis, vice president of Woodlands for Abitibi, announced the appointment of C. W. R. Day to manager of the Woodlands Department at Iroquois Falls, Ont. He will succeed T. H. Stone, who is retiring on company pension.

Atlantic Gummed Paper Corp.

I. Leon Weintraub has been appointed vice-president in charge of plant operation. He has previously been associated with Eastern Brass & Copper Co. and National Silver Co.

Olin Mathieson Chemical Corp.

O. R. Gibbons, in his newly-appointed position as product manager of cartons for the Packaging Div., will be directing all carton activities including production and sales. He will be located at the Forest Products headquarters in West Monroe, La., where Olin Mathieson recently opened its new carton plant.

Allied Paper Corp.

Promotion of Charles Wykstra to the position of controller for Allied has been announced. He will replace Garner Towne who has resigned from the company.

Milprint Inc.

Shy Rosen will now take responsibility in a newly-created position of senior vice president for Milprint. Formerly vice president in charge of planning, Rosen will now assist in the general management of the corporation.

Longview Fibre Co.

As a Northwest tree farm supervisor, Walter Lee Robinson has now been promoted to chief forester for Longview. In addition to regular duties in this position, Robinson will have direct supervision of reforestation activities involving seeding and planting of non-stocked areas.

Celgar Ltd.

Eugene De Luca has been appointed as pulp mill manager for Celgar's bleached kraft pulp mill which is now under construction near Castlegar, B. C.

West Virginia Pulp & Paper Co.

The appointment of Harrison G. Hull Jr., as treasurer of Rigesa, S. A., a wholly-owned subsidiary of West Virginia Pulp & Paper Co. in Brazil, has been announced.

Folding Paper Box Association of America

J. N. Andrews, executive vice president of Ohio Boxboard Co., Rittman, Ohio, has been re-elected as president of the FPBAA. He has served on the FPBAA board of directors since 1948 and has been a member of the executive committee for five years. He is also a director of the National Paper Board Association.

Chesapeake Corp. of Virginia

E. L. Dozier, now superintendent of Chesapeake's pulp mill, has been promoted to general manufacturing superintendent. Stanley J. Ryczak will now assume the duties as pulp mill superintendent.

Riegel Paper Corp.

Frederick S. Leinbach, executive vice president of Riegel, has been elected president of the company. John L. Riegel, who has been chairman of the board and president, will continue as chairman of the company.

In a realignment of Riegel's industrial relations staff, the following changes were announced: W. M. McFeely was appointed vice president-organization for both Riegel Textile Corp. and Riegel Paper Corp.; G. W. Clark was appointed director of industrial relations; R. A. Warner was appointed supervisor of industrial relations; P. V. Kolonia was appointed supervisor of placement for both

PHOTO BY EWING GALLOWAY, N. Y.

HAM FELTZ says:

"Reminds me of HAMILTON Felts ... you can depend on them, too!"

"Once we design a Hamilton Felt
best suited to *your* needs,
every Hamilton Felt you re-order
is — like Old Faithful's hourly show —
exactly like the last one
— uniform in style and porosity!
And, since 1858, paper makers have found
that Hamilton Felts give longest
high quality performance between changeovers."

Why trust to luck? Why not
depend on Hamilton Felts every time?
Write, without obligation, today!

YOU CAN'T BEAT
Hamilton
FELTS

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Names in the News . . .

Riegel Textile Corp. and Riegel Paper Corp.; J. T. Allmon was appointed supervisor of management development.

William E. Anderson has been promoted to assistant superintendent of the converting department in Riegel's Milford, N. J., mill. Merle L. Noyes has been transferred to a newly-created position of technical assistant to the superintendent of the converting department in Milford. Joseph Judge was appointed assistant mill superintendent of Riegel's Hughesville mill. Robert Osborne was made night superintendent at Hughesville. In the Carolina division, George Root has been named as coating technologist.

Crown Zellerbach Corp.

Harold L. Zellerbach, chairman of the executive committee and acting board chairman of Crown Zellerbach, has retired from the company's active management.

Zellerbach was re-elected chairman of the executive committee by the board of directors. In this post, he will advise the officers of the corporation and see that the policies set by the board are carried out. He will also continue as acting board chairman during the absence of J. D. Zellerbach as U. S. Ambassador to Italy.

F. S. Loinbach

H. L. Zellerbach

Allied Personalities

John L. Sigler has been named regional manager of the Southern sales region for John W. Bolton & Sons Inc. and the Emerson Mfg. Co. Div.

Robert F. Davis has been named manager, Two-Way Radio Sales, for Motorola Communications & Electronics Inc. Taking Davis' former position of regional manager in Northern Illinois, Northeastern Indiana, Eastern Wisconsin and Michigan's Upper Penisula is **Eric Goleas.**

Albert O. Dyson has been appointed sales manager for Krofta Engineering Corp. of Lenox, Mass. For the past 10 years, Dyson has been manager of the Pulp & Paper Division of Nichols Engineering & Research Corp., New York.

Link-Belt Co. has announced that **Richard S. Moyer** has been appointed assistant to **Richard E. Whinrey,** vice president in Indianapolis. **Moyer,** who has been general manager of the company's North Central Division, will be succeeded by his assistant **George Ramsden.**

Vernon L. Tipka has been appointed as the West Coast representative for Waterbury Felt Co. of Skaneateles Falls, N. Y. He will replace William A. Kelly of Portland, Ore., who retired in December 1958.

Charles R. Anderson, economic and market analyst of Great Northern Paper Co., has been appointed vice president of Econometric Institute Inc. He will replace **Benjamin Slatin** who recently resigned to join the American Paper & Pulp Association.

Karl F. Gothner has been appointed sales manager of Rosenblad Corp., New York. He was formerly assistant sales manager.

Joseph T. Ryerson & Son Inc. of Boston, Mass., have announced the following changes: **Joseph A. Moran** has been named sales manager; **Arthur B. Burke,** district sales manager; and **Napier B. Caldwell,** district sales manager.

Charles C. Cayce has been named to the newly-created post of Southern regional manager of General Dyestuff Co. (a sales division of General Aniline & Film Corp.). It was also announced that **W. B. Huntley,** formerly assistant branch manager in Charlotte, N. C., will succeed Cayce as branch manager.

Nicholas Bachynski of Lyndhurst, Ohio, has joined the Pulp & Paper Group of Chas. T. Main Inc. as a member of the engineering staff. Bachynski was previously affiliated with Reliance Electric & Engineering Co. of Cleveland.

Manchester Machine Co. of Middeltown, Ohio, has appointed **Ray Evans, Alton Trufitt, Gene Roberts, Dimitrijs Rubenis** and **Geoffrey**

ATKINS Chipper Knives give you consistently better quality chips . . . with less time out for sharpening. ATKINS special alloy steel and exacting heat treating methods assure the *perfect combination of hardness and toughness* to cut clean and fast without splinters or sawdust . . . and to withstand the heavy shocks of high production runs.

Call your ATKINS Distributor . . . or order direct from

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Jowett as project engineers. The company has also announced that **Gene Faulkner** was named industrial engineer and **Elmer Hadler** as supervisor of accounting.

The Industrial Div. of Jeffrey Mfg. Co., Columbus, Ohio, has realigned its field office operations. The following appointments have been made: **William K. Myers,** regional sales manager for the Eastern region; **Paul Lawall,** manager of the New York office; **William Cheney,** district manager of Boston; **Howard S. Davies,** regional sales manager for the East Central region; **Paul Hendry,** manager of the Pittsburgh office; **Dean Diehl,** Columbus, Ohio, district office; **Elmer F. Longnecker,** regional sales manager for the Central region; **William W. Etchberger,** district manager for Detroit; **Vernon L. Ekblad,** regional sales manager for the Southern region; **Charles E. Lawall,** district manager at Houston; **James C. Elliot,** sales engineer to the Raleigh, N. C. branch; and **Thomas R. Bodden,** Mobile territory.

Raymond H. Harper has been named sales engineer for Western Machinery Co.'s Torque-Flow pump sales in states west of the Mississippi.

Charles M. Doscher, head of chemicals sales for Dow Chemical Co.'s New York office, has been promoted to the newly-created position of sales manager of chemicals for Dow international companies, Dow Chemical International Ltd., S. A. and Dow Chemical Inter-American Ltd. **Frank H. Sellars,** of the Dow Atlanta office, has been advanced to succeed Doscher at New York.

Necrology . . .

George L. Witham

George L. Witham, a salesman for Orr Felt & Blanket Co. of Piqua, Ohio, died on May 19. Witham served Orr Felt as a representative in the South Central part of the United States since December 1945.

Theodore F. Duffy

Theodore F. Duffy, Northeastern district sales manager for Standard Products Div., Union Bag-Camp Paper Corp., died recently at his home in Long Island, N. Y. He joined the company as a salesman in 1932 and became district sales manager in 1946.

Frank I. Peterson

Frank I. Peterson, widely known specialist in the manufacture of facial and other tissue grades of paper died at Greenwich, Conn. He began his long career in the paper industry in his native Sweden at Fengersfors Paper Mills.

Peterson moved to Canada in 1911 and became the first paper mill superintendent at the Wayagamack Kraft Mill, which is now Consolidated Paper Corp. at Three Rivers, Que. Moving from Canada to the United States at the end of World War I, he worked for American Writing Paper Corp. Peterson is survived by his son, Frank T., President of Black-Clawson Co.

Alva F. Gluck

Alva F. Gluck, former president and general manager of Coated Paper Products Co. (later to become known as Minerva Wax Paper Co.), Minerva, Ohio, died in April. He retired from the firm six years ago.

Robert D. Rusch

Robert D. Rusch, manager of Chase Bag Co. paper mill in Chagrin Falls, Ohio, died last month. Manager of company's mill since 1957, he spent his entire business life in the paper industry.

Rusch was previously with Mosinee Paper Co., International Paper Co. and Kimberly-Clark Corp. He held a Master's Degree from the Institute of Paper Chemistry and was a member of TAPPI and the American Pulp and Paper Mill Superintendent's Assn.

John G. Jackson

John G. Jackson, prominent corporate lawyer and business executive, died recently at his New York home. He served as general counsel and director of American Viscose Corp., director of Press Publishing Co., Chemstrand Corp. and Ketchikan Pulp Co. Jackson was also personal attorney for President Eisenhower.

Paul R. Bachman

Paul Riegel Bachman, retired vice-president in charge of sales for Riegel Paper Corp., died at the age of 76. Bachman had been vice president and sales manager at Riegel for almost 25 years before his retirement in 1947.

Jones Adapta-Plug

The completely bandless plug for *all* Jordans, the Jones Adapta-Plug is also the strongest, most adaptable, most economical plug ever made.

This revolutionary advance, exclusive with Jones, not only holds bars more securely, reduces slot wear and corrosion, but also cuts hours from the job of stripping and filling.

Before you replace another Jordan plug — ask your Jones representative about Adapta-Plug — or write us direct.

Jones FULBAR SHELL FILLINGS

Fulbar Shell Fillings eliminate keys and wedges. One piece construction fits shell body of any Jordan, simplifies handling, cuts installation time. And the patented No-wave pattern — also exclusive with Jones — has no sharp bar-ends to form strings or lumps.

For improved quality, more economical, trouble-free operation — make your next Jordan filling a FULBAR.

Rigid, one-piece FULBAR easily accommodates to inequalities in shell body of old, worn Jordans — is simpler to install, easier to grind in.

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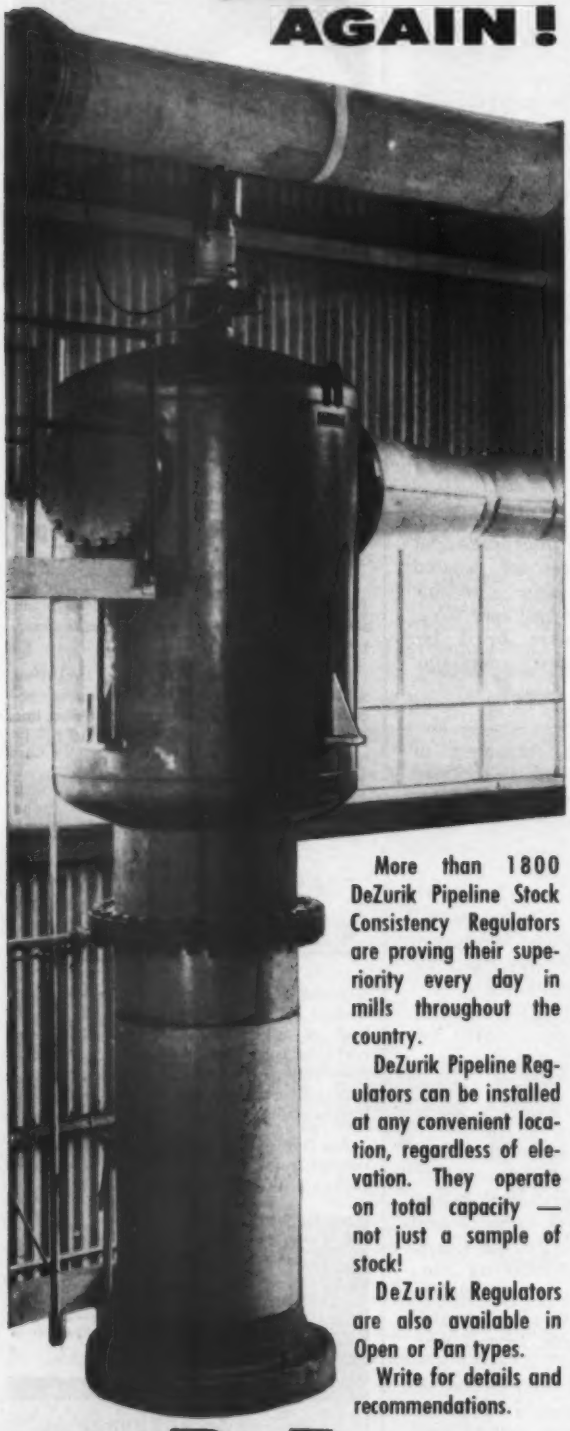

More than 1800 DeZurik Pipeline Stock Consistency Regulators are proving their superiority every day in mills throughout the country.

DeZurik Pipeline Regulators can be installed at any convenient location, regardless of elevation. They operate on total capacity — not just a sample of stock!

DeZurik Regulators are also available in Open or Pan types.

Write for details and recommendations.

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FOREIGN ABSTRACTS

Automatic controls for sulfite cooks

This is a brief description of automatic controls and the regulation of sulfite digestions in the U.S.S.R., based largely on the experience of other countries, but using instruments of Russian design.

The control system, which has been tested under mill conditions, is to be installed in various sulfite pulp mills. It consists of a liquor-measuring apparatus and of pressure- and temperature-measuring and regulating instruments. The temperature control may be either indirect, based on a steam-supply regulator, or it may be direct, using a thermocouple. The latter is to be provided for those mills which use forced-liquor circulation. A remote control panel is to be connected with the various instruments.

M. S. Voroshilov and N. G. Solyus, *Bumazh. Prom.* 33, No. 9, 11-13 (Sept. 1958) (original in Russian) through *Abstr. Bull. Inst. Paper Chem.* 29, 1165-6 (1959).

Cellulose structures during reprecipitation from solution

The disaggregation, persistance and the formation of newly-ordered structures during the precipitation of cellulose and cellulose nitrates from highly-diluted solutions of various types were studied. The techniques used are described.

Evidently, characteristic bodies are obtained at various stages and these have been photographed and compared with the corresponding elements in the original unswollen cellulose fibers. Thus the origin and development of these structures have been traced back and these findings have led to the formulation of certain hypotheses which appear to explain the formation of the ordered areas when technical cellulose solutions are being processed. Both photomicrographs and electron micrographs are given.

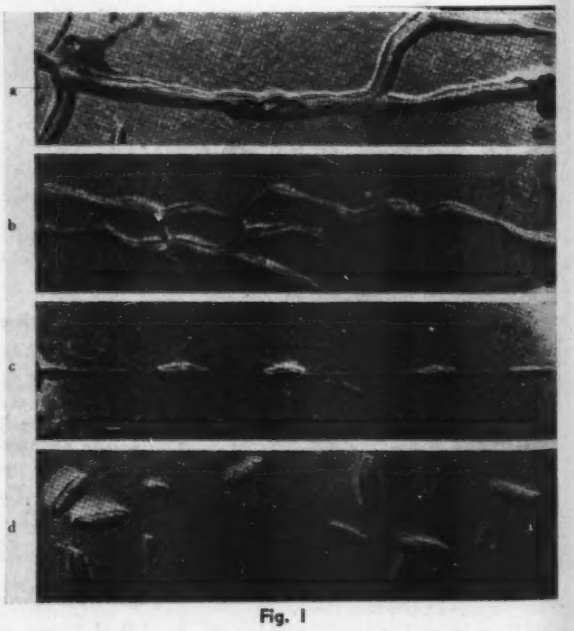

Fig. 1

For example, Fig. 1, in a series of electromicrographs, shows various stages of cellulose nitrate disintegration. In this figure, (a) shows smooth strand of film thickness; (b) shows strands with periodic indentations; (c) illustrates the fine, internodal extended threads which reach the dimensions of crystallites; and (d) shows isolated film segments with rounded ends.

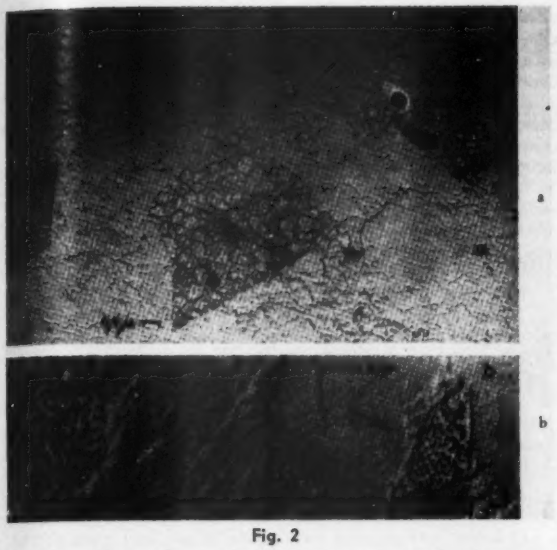

Fig. 2

Fig. 3

In certain instances, the author has also shown the persistance of portions of the original cell wall that are retained on precipitation from very dilute solutions; e.g. in Fig. 2, the upper electronmicrograph shows the persistance of the primary walls of cotton fibers, whereas the lower one shows the tertiary layer of a spruce pulp. Fig. 3 illustrates the shrinkage on drying of a highly-polymerized nitrate fraction prepared from spruce pulp (D.P. 2700) after precipitation from a very dilute acetone solution.

Fourteen references and 20 halftones are included. Hans Dolmetsch *Das Papier* 13, 37-44 (1959), in German.

Mercury measurements in electrolytic cells by a radioactive isoptope

The Maryvale plant of the Australian Paper Manufacturers Ltd. employs a unique method for measuring the amount of mercury in its De Nora cells, which are used in chlorine production. About three quarters of a ton of mercury flows continuously through each cell, where it serves as a cathode for the electrolysis of brine. It then carries out the sodium in the form of amalgam, and flows down through a decomposer, when this sodium is given up as sodium hydroxide to counter-current water. The mercury is then pumped back into the cell. Of the 24 such cells in the plant, usually 20 are operating simultaneously.

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LIQUID SULFUR DIOXIDE

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In checking plant operation and also for accounting purposes, periodic stock-taking of this mercury is required. This could be done by draining off the mercury and weighing it, but the system does not drain cleanly and it would have to be dismantled, whereby the mercury would then have to be hosed out. Any such method is extremely expensive because of losses, both in production and manpower. In its place, a radioactive mercury dilution technique is used, where one man can measure the mercury in all cells on the same day without interfering with production. The principle is to add to each cell a definite amount of the radioactive isotope Hg^{203} and allow it to circulate in the cell until the mixture is complete. Samples are then removed and the isotope concentration is measured by determining the activity of the sample in a liquid-jacket Geiger-tube, which is fully described and illustrated. Thus, the dilution factor and the total quantity of the mercury can be determined for each cell.

The operational technique is described clearly. Safety precautions are also given in detail, so as to prevent external and internal radiation. The dispensing of the isotope has been carried out at the Commonwealth X-ray and Radium Laboratory of Australia. The cost of special equipment for this work (excluding laboratory and fittings) is about 500 pounds. The consignment of radioactive mercury for each stock-taking costs about 90 pounds.

The method was discussed. J. G. Campbell. *APPITA* (J. Australian Pulp and Paper Industry) **12**, No. 2, 51-56 (1958).

The reliability of paper testing measurements

The uncertainties in testing are mainly due to the inherent non-uniformity of paper, which may be characterized either by relative or constant variations. Incidental errors of measurement may also be caused by deficiencies in the instruments, environmental influences and personal failings, as well as random events. In presenting data, care must be taken in the rejection of any observations, in the rounding off of numbers, when computing measures of information and in combining different sources of error.

The author emphasizes three concepts (accuracy, precision and constancy) in illustrating the way in which errors should be taken into account when defining "reliability". Factors which govern reliability are discussed, and there are pictorial representations demonstrating schematically results that may be precise but inaccurate, accurate but not precise and results that are both inaccurate and imprecise.

There is also a pictorial representation of the term "constancy". Scatter diagrams are given and discussed. In discriminating various instruments, the limitations of design and adjustment are taken into consideration, as well as the effectiveness of standardization in its relationship to different methods used in their calibration and verification. Effects of interpolation and the rounding off in making scale readings are illustrated. In controlling outside variables, physical and statistical adjustments that may be made to counteract disturbing influences are contrasted.

The author makes a recommendation for specifying the reliability of a test procedure, and in order that a consistent and meaningful expression for the reliability of a test may be achieved, he presents a case for adopting a standard procedure that is based on elementary statistics. This would serve as a guide for authors and for standards committees.

Seven figures and 20 references are given. The paper is by the statistical officer of Associated Pulp and Paper Mills Ltd. L. R. Odlum. *APITTA* (Australia) **12**, No. 2, 27-41 (1958).

Alcoholic nitration of lignin

The authors contend that the alcoholic nitration of wood permits the quantitative determination of cellulose that remains as the residue from this operation. Simultaneously formed in this nitration is nitrolignin, which is claimed to furnish a quantitative measure of the lignin in the original wood. However, these results for lignin are invariably much lower than those found in the literature. For example, the results for lignin which follow may be compared with the average figures given in parentheses which, according to Nikitin, represent the work of other analysts using the Klason (or similar) procedures: spruce 18.93 per cent (28 per cent); beech 11.7 per cent (21 per cent); oak 12.7 per cent (24 per cent); and walnut 10.5 per cent (19 per cent).

The present authors' extremely low values are not ascribed by them to the partial oxidative degradation of the lignin during

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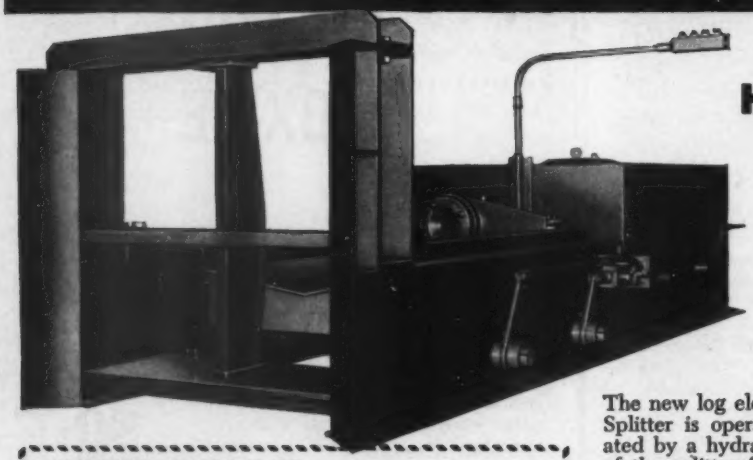

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alcoholic nitration, although they admit that small amounts of carbon dioxide, oxalic acid, carbon monoxide and water are formed. The sum total of these by-products based on the weight of the wood, represent a loss of only 1 per cent in the case of spruce and 0.5 per cent for beech. The higher lignin figures that are given in the literature are ascribed to co-precipitated carbohydrate material, firmly sorbed on the precipitated lignin.

Seven references and eight tables are given. K. Kürschner and G. Hostomsky. *Holzforschung* 12, No. 5, 142-8 (1958), in German.

Hemicelluloses—their role in papermaking pulps

A comprehensive symposium was held in Paris in 1958, of which this is a complete report. Given besides the four papers is a series of discussions. There were three speakers: Dr. A. Roudier, a research chemist of the Institut chimiques appliques; Dr. M. Chêne, associate director of the French School of Papermaking at Grenoble; and M. Monzie of the staff of the Centre Technique de l'Industrie des Papiers, Carton et Cellulose, at Bordeaux.

In the first two papers Roudier discussed the constitution of the hemicelluloes and the methods used in their study. Professor Chêne discussed the relationship of hemicelluloses to pulp properties. In this exposition he included their chemical and physical-chemical properties; their localization in plant tissues; the bonding of fibers in paper sheets; the hemicelluloses that are found in pulps; their behavior on beating; the effects of hemicelluloses on pulp properties (such as tensile strength, burst, folding endurance and tear resistance); the importance of the hemicelluloses in the manufacture of paper; and the effects of adding hemicelluloses to pulps. M. Monzie discussed the fate of hemicelluloses during both alkaline and acid digestions.

A. Roudier, *Bulletin, Assoc. tech. de l'ind Papertiere* (1958) 99-108, with 42 references and 13 figures; and Roudier, *Ibid.* 110-120, with 15 references and 11 figures; Chêne, *Ibid* 122-30, with 37 references and four figures; and Monzie, *Ibid* 133-43, with 36 references and 12 figures, (in French).

Specific external surface of beaten pulps

In determining the external surfaces of sulfite and kraft pulps during the beating operation, the adsorption of colloidal Congo red was used. During the beating, the external surface increased more rapidly in the case of kraft than with sulfite pulps, and undried pulps showed a higher external surface (and formed stronger sheets) than did pulp dried prior to beating.

The greatest increase in external surface (up to 70,000 sq cm per gram) was obtained on beating kraft pulp in a beater provided with a basalt tackle; this also led to a higher degree of bonding during sheet formation.

E. Y. Vinetskaya. *Bumazh. Prom.* 33, No. 11, 5-6 (1958) (Original in Russian); through *Chem. Abstr.* 53, 6612 (1959).

Folding endurance of papers

The various instruments and methods for testing the folding endurance of paper were tested in Switzerland with the hope of standardizing the fold test. However, no single method or instrument could be pointed to as the most suitable one. Despite this, the study gave an insight into the principles and requirements of folding endurance testing, as well as the problems involved.

The manner of folding the sheet (*i.e.* double folding under tension versus folding under pressure) seems one of the principle factors that affect the results. Various testers, even those operating on the same principle, may give divergent results. In certain instruments (for example, those of Frank and of Köhler-Molin), the clamp arrangements give rise to differences. The Schopper, Köhler-Molin and l'Homme-Argy testers seem to give comparable evaluations of the double folding endurance of a paper, and of these the Schopper appears to be the most popular.

The Brecht-Wesp pressure folding tester has the advantages of a short testing time, little scattering of data and good service behavior when compared to other testers but it may lead to a totally different evaluation of specialty papers. The authors feel that folding data should be rounded off to only two significant figures. The significance of the fold test is discussed.

Seven tables, two figures and eight references are included. P. Fink and R. Schweizer. *Textile-Rundschau* 13, No. 12,694-704 (1958); (Original in German) through *Abstr. Bull. Inst. Paper Chem.* 29,1179-80 (1959).

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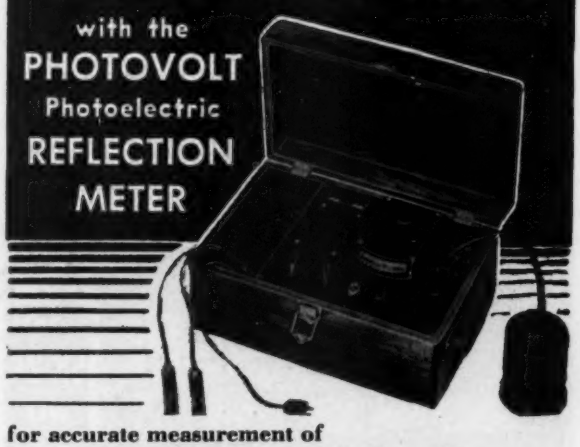

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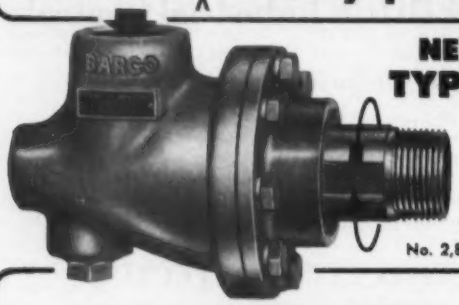

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PATENT REVIEWS

MELVIN NORD*

Semi-chemical pulping process

U. S. 2,862,813, issued December 2, 1958, to Clarence Birdseye and assigned to Process Evaluation & Development Corp., describes a continuous process for producing high-yield pulp, by means of maximum physical shedding effects and a minimum consumption of chemical digestants.

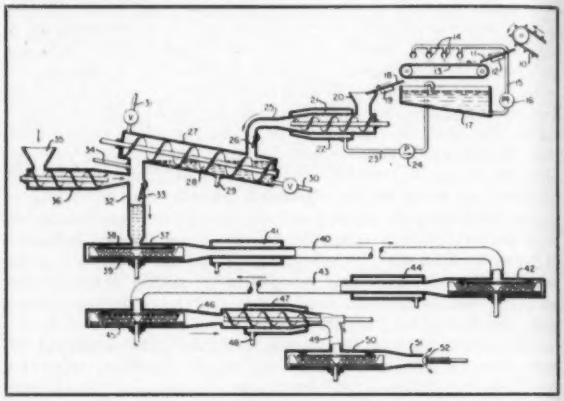


Fig. 1

As shown in Fig. 1, raw wood chips are continuously delivered for treatment by a conveyor 10. The chips fall from the conveyor upon an inclined chute 11 to which is attached a vibrator 12 causing the material to pass freely down the chute to a horizontal mesh conveyor 13. Above the conveyor 13 are arranged a series of spray heads 14 supplied with hot solvent liquid by a pipe 15 and pump 16 leading from a mixing tank 17. By these elements, the first step of the process is carried out; that is to say, the fibrous material delivered to the conveyor 13 is showered with hot white liquor or with a mixture of liquors drawn off at subsequent stages of the process and returned to the tank 17 with a predetermined percentage of white make-up liquor.

Upon leaving the conveyor 13, the soaked fibrous material falls upon a second chute 18 provided with a vibrator 19 and leading to a hopper 20. The hopper 20 forms part of a screw press 21 having a perforated wall and being surrounded by a jacket 22. The fibrous material is passed through the screw press by the rotation of its helical screw, and excess liquor is expressed and returned through a pipe 23 and pump 24 to the mixing tank 17. The partially de-liquored or de-watered fibrous material is then forced from the screw press into a duct 25, which is directed downwardly and provided with a check valve 26.

The duct 25 leads into the lower end of an upwardly-inclined steaming, deaerating and cooking cylinder 27 containing a power-driven screw 28 and having an inlet pipe 29 by which the white liquor may be supplied partially to fill the cylinder. The cylinder is also supplied with a valved pipe 30, by which depth of liquor in the cylinder may be regulated. Means are provided for maintaining within the cylinder any desired steam pressure. At its upper end, the cylinder is provided with a valved steam and air outlet 31. The compressed plus of material is broken up, immersed in hot liquor and advanced toward the left along the cooking cylinder 27. Thus, the fibrous material which is finally delivered from the cylinder through a downwardly-directed duct or standpipe 32 has been more or less saturated with solvent solution, partially cooked and well de-aerated.

The duct 32 is provided with a check valve 33 to prevent blow-backs at this stage of the process. Also provided is an inlet pipe connection 34 by which water or weak digestant liquor (at the desired temperature and pressure) is supplied in such an amount as to maintain a substantial head of liquor in the duct at substantially the same pressure as that in the cylinder 27. Blow-backs

from cylinder 27 to the press 21 are prevented by both the valve 26 and the plug of material formed in the discharge throat of the press 21.

As an additional and optional unit of the apparatus, a hopper 35 is shown as part of a screw feeder-press 36 delivering into the vertical duct or vessel 32. Additional raw material requiring a minimum of digestion, such as pith or short fine fibers, may be brought into the process at this state to by-pass the initial steps of the process.

(A modified apparatus for use in the manufacturing of pulp from pith is shown by the same inventor in U. S. 2,862,814.)

The mixture of partially-digested fibrous material and raw material, immersed in the liquor contained in the standpipe 32, is now delivered directly to the center of a shredder pump 37. This unit includes a stationary circular upper plate 38, having downwardly-directed pyramidal teeth and a circular lower plate 39 having similar upwardly-directed teeth. The lower plate is rotated at high speed by a shaft, and the effect of the shredder on the partially-digested mixture passing through it is to shred the fibrous pieces with the grain of the material and separate them progressively into fiber bundles of smaller and smaller size, thus exposing the increased surface area for contact with the digestant liquor.

The duct 40 constitutes a digesting zone. As shown, it is provided with a reheater 41, by which the temperature of the treated material may be maintained or raised during the portion of the digesting process which occurs in this zone.

The shredder pump 45 is provided with an outlet duct 46 leading directly to a screw press 47 which has a perforated wall and a jacket in which expressed liquor is collected and from which it may be discharged through an outlet pipe 48 and conducted to the mixing tank 17.

The screw press 47 is shown delivering the fibrous material through a down-turned duct 49 to a fourth shredder pump 50 in the system similar to those already described and shown as discharging through an outlet nozzle 51.

Recovery of sodium sulfide and sodium carbonate from spent liquors

U. S. 2,862,887, issued December 2, 1958, to Robert Q. Boyer and assigned to Western Precipitation Corp., describes a process for the production and separation of sodium sulfide and sodium carbonate from the spent liquors of sulfate, acid or neutral sodium sulfite, or kraft processes of papermaking.

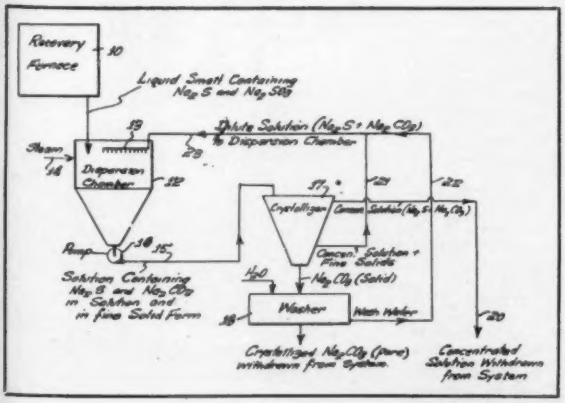
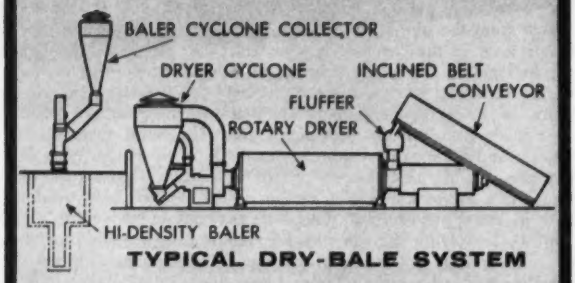


Fig. 2

As shown in Fig. 2, the recovery furnace is indicated at 10. The ash formed by the combustion process is discharged from the furnace as a stream of liquid smelt containing principally sodium sulfide and sodium carbonate, along with some other constituents in minor quantities. This stream of liquid smelt is introduced directly into the dispersion chamber 12.

Near the upper edge of the walls, there is a series of liquid sprays 13 which are so directed and located as to spray liquid over at least a portion of the upstanding walls of the chamber, so that a continuous liquid film is maintained flowing down the walls.

Within the dispersion chamber, the stream of liquid smelt is very finely subdivided by blowing it with a jet of high-velocity steam introduced by steam line 14. The smelt is subdivided into a



TYPICAL DRY-BALE SYSTEM

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dries groundwood pulp to 90% air-dry

Halifax Power & Pulp Ltd., using the Dry-Bale system, is now drying groundwood pulp at Sheet Harbor, Nova Scotia. The new system reduces shipping costs . . . saves storage space . . . permits pulp to be shipped to distant markets. The pulp is readily dispersible, requires less handling, and can be stored in warm climates.

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For descriptive literature on the new Dry-Bale system and the Heil dryer, write The Heil Co.

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very finely-divided form and carried across the chamber by the force of the steam jet, to he delivered to the liquid film on the walls of the dispersion chamber. The steam jet is sufficiently spaced from the film on the walls of the chamber and the average temperature in the chamber is sufficiently low so that the finely-divided smelt cools to the point of solidification before it reaches the liquid film on the walls of the chamber.

An advantage of very finely dividing the smelt is that when the smelt is added to the liquid film, the solid material is quickly and substantially entirely dissolved in the liquid, even in the presence of macroscopic crystalline sodium carbonate. The liquid is a dilute solution of sodium sulfide derived from a later step in this process, at an initial temperature of about 140° to 180° F. Dissolving the solid material takes an appreciable length of time and is not necessarily complete within the dispersion chamber, but ordinarily also takes place as the solution containing solid particles moves through line 15 and pump 16 to crystallizer 17, and may not be completed until after the particles reach the crystallizer. In crystallizer 17, the liquid and solids are retained long enough for the very finely-divided smelt to completely dissolve.

As the sodium carbonate crystalizes out of the solution, it forms crystals that are much larger than the fine particles of smelt dissolved in the solution, and these crystals are several times the diameter of the filaments formed by the steam jet. The crystals can be removed continuously or intermittently, being transferred to washer 18. In the washer, it is preferable to wash the crystallized sodium carbonate with fresh water in order to remove any remaining sodium sulfide solution and improve the purity of the solid product.

The solution leaving crystallized 17 contains the sodium sulfide and some of the sodium carbonate from the smelt. Separation of the solid phase from the liquid phase in the crystallizer represents separation of the sodium carbonate and sodium sulfide. Although the solution leaving the crystallizing step is saturated with respect to sodium carbonate, this is but a small part of the whole and may be beneficial in later use of the solution. This solution leaving the crystallizing step is referred to as concentrated sodium sulfide solution. This compound is the one of chief interest in the solution.

A portion of this concentrated sodium sulfide solution is withdrawn from the system through line 20 to be used for any desired purpose. Another part of the concentrated solution may be withdrawn at a lower point in the crystallizer along with some undersized fine solids. In this case, it passes through line 21 to be reused in this process. This latter portion of the concentrated solution is diluted to the desired strength by the addition of the wash water removed from washer 18 through line 22. It is this portion of the concentrated sodium sulfide solution which is recycled. The diluted solution is returned by line 23 to sprays 13, which introduce it into the dispersion chamber.

Oxidative-reductive bleaching of groundwood pulp

U. S. 2,862,784, issued December 2, 1958, to Mearl A. Kise, Robert W. Barton, Robert H. Ingwall and assigned to Virginia Smelting Co., describes a multi-stage process for bleaching ground wood pulp, which renders it more acceptable as a component of high-quality paper.

The process consists of hydrosulfite bleaching of ground wood pulp, which has been pre-treated in a peroxide medium and stabilized with an acid sulfite or sulfur dioxide solution.

Fractionation of sulphite lye

U. S. 2,865,906, issued December 23, 1958, to John Hoye and assigned to Aktieselskabet Token Cellulosefabrik, describes a process for the fractionation of the waste liquor after the pulping of wood by the sulfite process, using certain organic solvents to effect the fractionation.

The following fractions are obtained: Fraction 1—high-molecular ligninsulphonic acids; fraction 2—low-molecular ligninsulphonic acids; fraction 3—sulpho-carboxylic acids; and fraction 4—aldonic acids.

Process for flame-proofing paper

U. S. 2,867,549, issued January 6, 1959, to Charles R. Outterson and assigned to Albemarle Paper Mfg. Co., describes a process for flame-proofing paper with water-soluble, flame-proofing salts. The paper product is characterized both by a high degree of flameproofness and excellent size properties, including good water resistance.

A sized paper is impregnated with an aqueous solution of the flame-proofing salts containing finely divided rosin in stable dispersion. The flame-proofing salts are characterized by a maximum pH of 7. The treated paper is finally dried in the usual fashion.

Apparatus for interrupting the formation of transverse rents in paper webs

U. S. 2,864,284, issued December 16, 1958, to Hermann Proffen, describes an apparatus for interrupting the formation of transverse rents in paper webs.

The apparatus consists of a pair of jet nozzles positioned above the web of paper on either side of the center line of the web, and light-sensitive cells operable when a break occurs in the web. When a break is detected by a cell, the jet nozzle on the other side is automatically moved in the direction of the web.

According to the inventor, this system prevents any incipient rent from extending throughout the width of the paper web.

Impregnated corrugated paperboard

U. S. 2,868,665, issued January 13, 1959, to Albert R. McManus, discloses a new impregnant for paperboard which increases the column loading strength to at least 300 per cent, and beam loading strength at least 200 per cent, regardless of humidity conditions.

The impregnant consists of fully refined, 133°F. melting-point, paraffin and limed rosin having 4.5 per cent lime content. The mixture is prepared by charging equal quantities by weight into a vessel and heating to 325°F. with an occasional mild agitation.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Manufacture of fibrous boards	Changewood Corp.	2,862,291	12/2/58
Reinforcement of box blanks	Alton Box Board Co.	2,862,425	"
Pulpwood grapple	Robert W. Larson	2,862,756	"
Epoxy wrinkle on rubber impregnated paper	Commonwealth Engineering Co.	2,862,835	"
Embossing hardboard	John L. Buckley et. al.	2,863,168	12/9/58
Box-forming machine	Federal Carton Corp.	2,863,370	"
Molded pulp packaging members	Keyes Fibre Co.	2,863,595	"
Fibreboard container	Grief Bros. Cooperage Corp.	2,863,596	"
Reinforced corrugated paperboard container	International paper Co.	2,863,597	"
Carton for cylindrical objects	Dacam Corp.	2,863,598	"
Bottle Carrier	Waldorf Paper Products Co.	2,864,531	12/16/58
Cover for paper containers	American Can Co.	2,864,546	"
Reclosable carton	Waldorf Paper Products Co.	2,864,547	"
Easy-opening container construction	Waldorf Paper Products Co.	2,864,548	"
Bag	Bemis Bro. Bag Co.	2,864,549	"
Bleaching method	Julien Dungler	2,864,662	"
Method of treating pulp mill alkaline bleach effluents	West Virginia Pulp & Paper Co.	2,864,811	"
Feeder cut-out for box-making machine	United States Automatic Box Machinery Co.	2,865,264	12/23/58
Apparatus for making glued corrugated cartons	International Paper Box Machine Co.	2,865,263	"
Manufacture of paperboard hat box bodies and cover flanges	Continental Can Co. Inc.	2,865,265	"
Dryer felt for fine-quality paper	Dietrich V. Asten	2,865,409	"
Paperboard tobacco pouch	Diamond Match Co.	2,865,498	"
Molded pulp carton	Diamond Gardner Corp.	3,865,547	"
Molded pulp container with tear strip	Keyes Fibre Co.	2,865,548	"
Carton	Bicomer Bros. Co.	2,865,549	"
Container having strong end closures	Bergstein Packaging Trust	2,865,550	"
Carton	John P. Rasmussen	2,865,551	"
Separable shipping container	International Paper Co.	2,865,552	"
Reinforcing and cover-supporting device for a container	Crown Zellerbach Corp.	2,865,553	"
One-piece beverage shipping case	Crown Zellerbach Corp.	2,865,554	"
Boxboard container	Lassiter Corp.	2,865,555	"
Bag	Bemis Bro. Bag Co.	2,865,556	"
Bleaching of kraft pulp	National Distillers & Chemical Corp.	2,865,701	"

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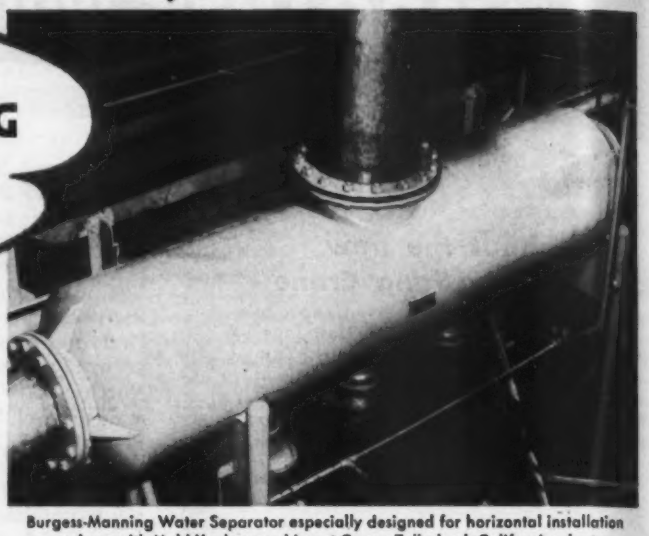

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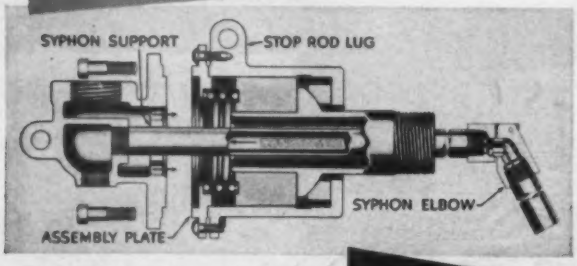

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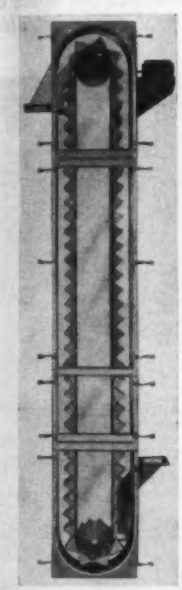
Continuous bucket elevators



Two new models of continuous bucket elevators, in the VC and GC Series have been announced. Both feature a continuous-gravity discharge where the back of the preceding bucket acts as a discharge chute. This design permits maximum capacity at the slowest speeds.

The new bucket elevators are said to be well suited for carrying chemical crystals, spray-dried products, chips, cubes, and similar types of broken materials. Both the VC and GC models are available in stainless-, galvanized- or carbon-steel construction with capacities of 40 cfm.

The VC elevators (shown in photo) offer the company's exclusive cantilever design to meet industrial sanitary standards for easy cleaning and access to the interior. The GC elevators are of more conventional design and used where products require more gentle handling. *Bucket Elevator Co.*

Circle No. 11 on Readers' Service Card

Multi-stage moisture register

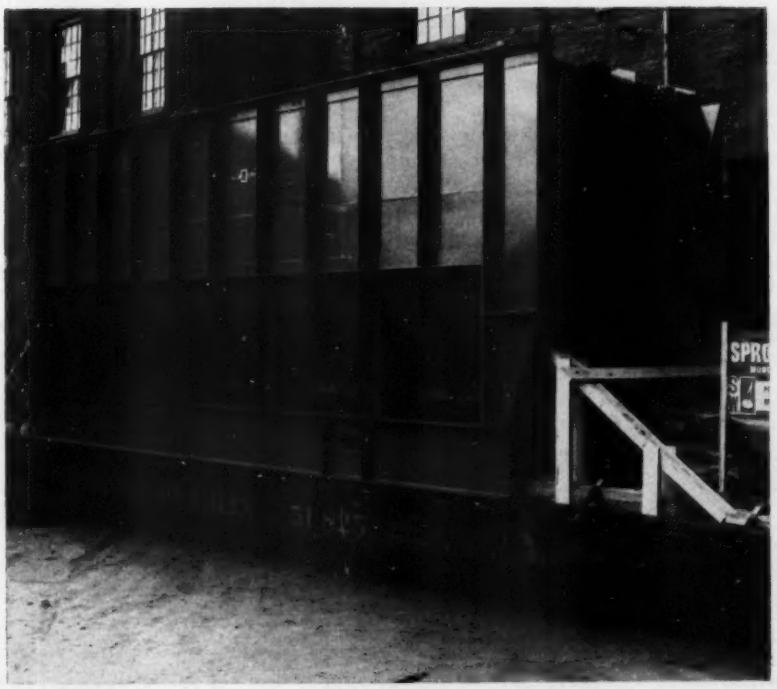
A new ultra-sensitive, moisture-indicating instrument with roller-type electrode for use on moving paper rolls has been introduced. The new model PM, incorporating five stages of sensitivity, solves moisture measurement problems on the production line which was formerly beyond the capacity of any single instrument.

A nomograph accompanying each model eliminates calibration curves on papers and similar materials of known density, enabling complete percentage moisture-content readings on the spot in a few seconds. It is accurate if the weight of the paper does not vary.

A new roller-type electrode enables the register to detect wet streaks or uneven moisture distributions while the paper rolls are in motion. The excellent mobility of the instrument allows instant answers on any part of the moving paper rolls or other similar materials for immediate corrective measures where necessary.

Model PM is completely portable, weighs 5 lbs. and is easy to use. It automatically compensates for line voltage fluctuations of 90 to 130 volts. *Moisture Register Co.*

Circle No. 12 on Readers' Service Card



Starch mixer

What is said to be the largest horizontal batch mixers ever to be built is now on the market. This huge mixer has a capacity of approximately 2000 cu. ft. and is designed for handling a full carload of 60,000 lbs. of starch. Its inside dimensions are 26 ft. long, 10 ft. wide and 18 ft. high.

A huge completely-welded, one-piece, double-ribbon agitator performs rapid uniform mixing. The agitator shaft rotates in heavy-duty, anti-friction pillow blocks mounted on outboard bearing shelves. *Sprout, Waldron Co. Inc.*

Circle No. 13 on Readers' Service Card

Foam-control compound

The availability of a new pulp and paper mill foam-control compound has been announced. Tradenamed, Atlas TS-204, it inhibits, breaks and controls foam in many wet operations of pulp and paper processing.

The compound is a semi-solid, paste-type defoamer that is emulsifiable in water and readily combines with emulsions or water-soluble materials. It is designed to effect low surface tension and increase flow properties.

Atlas TS-204 is shipped in 55-gal. open-head drums. No special storage is necessary. *Atlas Refinery Inc.*

Circle No. 14 on Readers' Service Card

Epoxy plasticizers

Two new epoxy-containing plasticizers have been developed. The new compounds, Flexol plasticizers 107-D and 163-D, both function as plasticizers and as vinyl-chloride stabilizers. They are completely com-

. . . Fluid Power news

REPORT NO. 12,10
NEW SECTI
AND DRIV
IMPROVE
PRODUCT

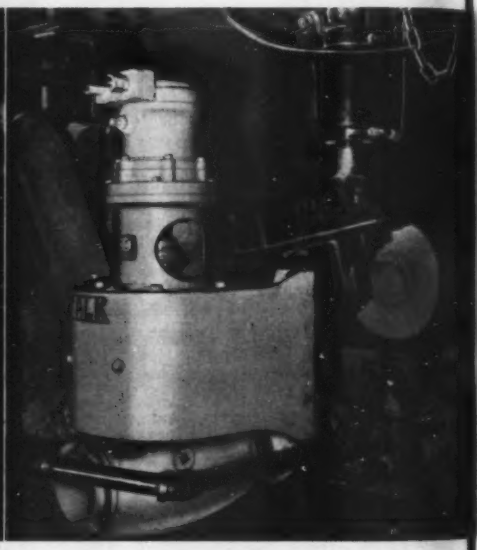
From Oilgear Application-Engineering Files

HOW OILGEAR HELPED SOLVE DRIVE PROBLEM FOR A NEW PAPER MACHINE SECTION

CUSTOMER: *A Large Midwestern Paper Manufacturer.*

DATA: To improve the finished surface of certain types and grades of paper, this manufacturer decided to insert a new sizing and smoothing section between existing sections of one of their paper machines. *Requirements: 1.* New section drive rpm must remain in same preset speed ratio with first dryer section roll regardless of over-all machine speed; allow precise, minutely controlled variation to increase or decrease wet sheet tension; hold constant speed within 6% regardless of increase or decrease of section roll pressures. *2.* Section drive to be inoperative at will without use of clutches . . . machine to operate with, or without the ne section for dual purpose processing. *3.* Drive mu be smooth, positive . . . without lag, shocks, or surge *4.* Drive must fit within extremely limited, availabl space, and be direct-connected to new section sizin roll. *5.* Complete, individual control from a convenient remote, push button station. *6.* Dependability, with minimum of installation, or maintenance "downtime."

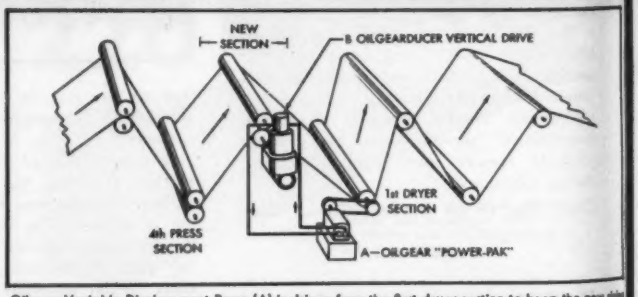
Note: A mechanical drive was considered, but space and control requirements would involve costly, major rebuilding of the entire machine.



SOLUTION: Oilgear *Application-Engineers*, working in cooperation with company engineers, analyzed the speed, torque, control, and space limitations of this installation; and recommended an Oilgear *"Any-Speed"* drive consisting of a separate, heavy-duty, Oilgear pump and motor for the following reasons. *1.* An Oilgear Type "DE," Variable Displacement Pump with Electric Remote Control and Reservoir fitted into the very limited space available, and could easily be driven from the first dryer roll. *2.* A standard *Oilgearducer*—an Oilgear Constant Displacement Fluid Power Motor with integral right-angle gear reducer—could be direct-connected to the new section sizing roll. *3.* A simple pushbutton station for controlling this new section could be conveniently mounted on the opposite side of the paper machine. *Actual operation has proved that all initial requirements were either met or exceeded.*

Being a positive displacement drive, the direct-connected sizing roll rpm remains in the same speed ratio with the first dryer roll regardless of over-all machine speed. Original constant speed requirement—within 6%—is exceeded in actual operation . . . speed remains stable within 0.5% max. variation under full min. to max. load change. Two remote control station pushbuttons command the electric pilot control motor to increase or decrease pump displacement, changing the hydraulic motor speed and the section to machine ratio . . . precisely varying tension on the wet sheet. Section can be independently started and stopped from this station while the paper machine is running. Exact drive load and temperature are indicated. *In over four years of continuous, high-speed service, there has been no reported maintenance on this drive.*

This paper manufacturer has also Oilgear-equipped a laminator winder drive; the center winder on a super-calender stack; the unwind and rewind drives on another super-



Oilgear Variable Displacement Pump (A) is driven from the first dryer section to keep the new sizing and smoothing press section speed in direct relation to the dryer section speed. Actual installation shown in photo above, left. The small, geared-head pump control motor which changes pump stroke can be seen to the right of the pump. Controlled Fluid Power from the pump drives vertically mounted Oilgearducer (B), direct-connected to the sizing roll of the new section . . . as shown in photo above

plus other applications in the mill and powerhouse. This user, like many others in all phases of all industry, knows that *for the lowest cost per year—it's Oilgear!* Additional drive application data is available—Bulletins 10600, 10051-G, and "News" 3, 5, 8—on request, without obligation.

For similar practical solutions to YOUR rotary or linear drive and control problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

THE OILGEAR COMPANY

Application-Engineered Controlled Motion Systems

1560 WEST PIERCE STREET • MILWAUKEE 4, WISCO

patible with vinyl-chloride resins, even at concentrations as high as 70 parts of plasticizer per 100 parts of resin.

Both plasticizers are suitable for use in vinyl plastics where superior resistance to outdoor weathering is required. They are suggested for use in protective coatings as acid acceptors for chlorinated solvents and as plasticizers for nitrocellulose coatings. *Union Carbide Chemicals Co. Div., Union Carbide Corp.*

Circle No. 15 on Readers' Service Card

Plastic-coated valves

Eccentric valves with plastic coatings are now being offered. The coatings greatly improve the corrosion resistance of cast-iron pipes, reports the company.

The plastic-coated valves are especially suitable for neutral salt solutions, alkalies, alkaline salts, mild acids, etc. They are also an economical answer to iron contamination in water distillation, demineralization and deionization systems.

They work on a unique eccentric principle which pivots the plug eccentrically in the body of the valve to match an eccentrically raised seat. The plug touches the valve body only when the valve is closed and plug friction is completely eliminated. Their resilient-faced plug eliminates the need for lubrication to get tight shut off. *De Zurik Corp.*

Circle No. 16 on Readers' Service Card

Front-seal glue

A new type of fast-drying, front-seal adhesive, which combines the economy and glossy-film qualities of a dextrin glue with the non-curl and machine-speed advantages of a resin, has been introduced.

Marketed as Layflat, the new adhesive reportedly provides superior adhesion, does not block and runs cleanly at high production speeds with little or no drying heat required. It is highly recommended for use on white-wove or kraft-paper stocks.

Because Layflat does not contain volatile organic solvents, it is non-flammable, nontoxic and will maintain its stability under varying production or climatic conditions. No special glue pot, seasonal changes in adhesive or machine equipment are necessary.

Due to regional preferences in film color, there are two versions of the front-seal adhesive—16-6270 (very light in color) and 16-1672 (slightly darker). Both versions are identical in every other respect. *National Adhesive Div., National Starch Products Inc.*

Circle No. 17 on Readers' Service Card

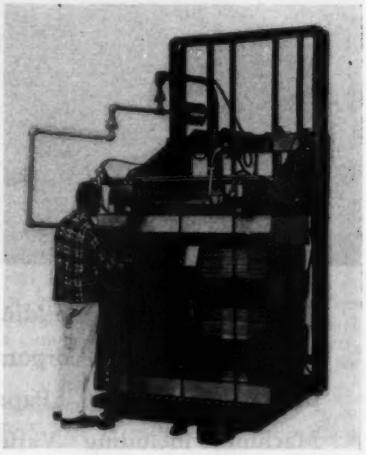
Combined electric clutch and sheave assembly

A combined electric clutch and sheave assembly, known as Electro-Sheave, used for direct installation on all NEMA electric-motor shafts, is announced. Five sizes of standard clutch units from 1 to 25 hp. are in production. They can be applied on new equipment or be used to modernize existing machinery.

Electro-Sheaves can engage or release at any speed. For inching or jogging, several starts are possible in less than one revolution of the clutch, without what is considered wear or tear on motors, controls or machinery. Release is instantaneous and the load is braked without plugging the motor.

The direct-electrical control of the clutch facilitates the use of pushbuttons, relays and other automatic devices. *Warner Electric Brake & Clutch Co.*

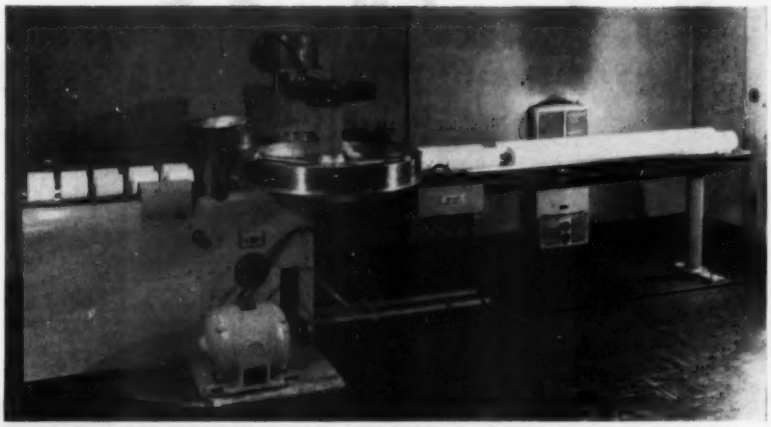
Circle No. 19 on Readers' Service Card



Steel-strapping press

The availability of a new steel-strapping press is announced. It is known as model E-50.

In the above photo, the operator is using an A-4 steel strapper suspended from a



Automatic band knife

The machine pictured above has been designed to reduce costs and double production by separating the winding and slitting operations. For example, in the production of toilet tissue, a rewinder formerly producing 300 cases per day with slitters, now doubles that production without slitters by means of increased winding speed and reduced downtime due to web breakage. The wound product or "logs" from several winders are then automatically fed into the new DU-CUT Automatic Band Knife or "Log Cutter" which cleanly divides the logs for a finished product.

Other advantages claimed are: elimination of slitter problems and costs; savings in core costs and handling; increased output per winder operator (Handling but one long core per shaft, rather than as many as 20 short cores); elimination of waste due to interleaving in the winding-slitting method; a clean-cut face in the finished product; improved handling in the packaging operation.

The machine is also adapted to interfolded, as well as wound products. *James A. Ferris (Product Designer).*

Circle No. 18 on Readers' Service Card

No. 1 and No. 2 Paper Machines at

NICOLET

PAPER CORPORATION
WEST DE PERE, WISCONSIN

with NEW stock entrance equipment by . . .

VALLEY

We are currently building for Nicolet Paper Corporation a *complete* 160" Paper Machine, including Valley Stock Entrance Equipment.

For information of any nature pertaining to improving your paper-making machinery, write —

VALLEY IRON WORKS COMPANY
APPLETON, WISCONSIN

STOP TELESCOPING ROLLS • MUSHROOMING CORES

Use HORTON Clutches and Brakes to control the sheet tension on your center winders and back stands. Take the guess work out of tensioning and let Horton equipment give you uniform good rolls all the time.

VARIABLE SPEED CLUTCH PULLEYS
GOVERNOR CONTROLLED BRAKES

HORTON MFG. CO., INC.
MINNEAPOLIS 14, MINNESOTA

New Products . . .

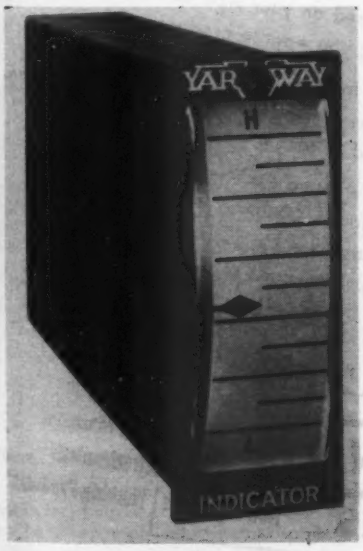
tool mount. This air-powered tool tensions, seals and cuts straps.

Compression of material by pneumatic power results in compact, neat packages that have bundle stability and are easy to handle. After compression, the strapping is fed all the way around the package and back to the operator at the rate of 4½ ft. per sec. Compression is maintained until all straps are applied.

Several equipment options allow the E-50 to be easily adapted to many different strapping operations.

The steel-strapping press is 63 in. wide, 93 in. deep and 136 in. high. It is operated by one man at all times. *Acme Steel Co.*

Circle No. 20 on Readers' Service Card



Liquid-level indicator

A new miniature, secondary, liquid-level indicator has been developed. It will duplicate readings from a primary Yarway liquid-level indicator or Yarway differential pressure transmitter anywhere in the plant.

The new indicator is similar to the standard Yarway electronic secondary indicator, but is about one-quarter of the size. The outstanding feature of this miniature design is the substitution of a transistorized amplifier in place of the vacuum-tube design in the full-size model.

It is recommended for instrument panels where fluid lines under pressure are undesirable, for remote locations where distance precludes use of pressure tubing, where freezing may be encountered and where installation is far above actual liquid level. *Yarnall-Waring Co.*

Circle No. 21 on Readers' Service Card

Plastic valves and strainers

The addition of three sizes—¼, ⅛ and 1¼ in.—to the company's rigid PVC Y-globe valves, check valves and strainers is announced. The company can now offer these products in a complete range of sizes from ¼-2 in.

These products are said to offer exceptional resistance to inorganic salts, alkalis, acids and other corrosive fluids used in the chemical, pulp and paper and allied industries. These plastic Y-globe valves, check valves and strainers operate successfully at pressures to 150 psi at 75° F. The 3-in. size will be available soon. *Walworth Co.*

Circle No. 22 on Readers' Service Card

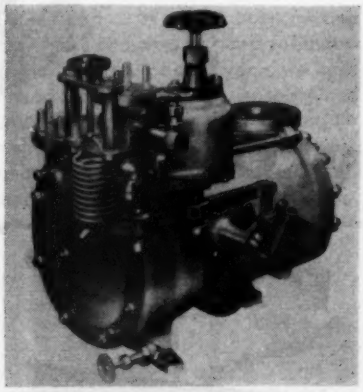
Vane pump

A new, variable-delivery, 5-gpm., vane pump has been made available. The pump includes an integral-pressure compensator which controls pump volume at preselected adjustable pressures.

Designed for pressures from 200 to 1000 psi., the new pump limits its delivery to system demand. Maximum delivery can be limited by means of mechanical adjustment. Sharp cut-off characteristics enable the pump to deliver nearly full volume up to the compensator setting even at low-operating pressures. Variable-volume and pressure-compensation features eliminate the necessity for a relief valve and attendant piping.

The pump is ideally suited as a fluid-power source for varying volume-demand circuits. The nominal 5 gpm. rating is at 1800 rpm. It is available for flange, foot or gasket mounting. *Vickers Inc., Div. of Sperry Rand Corp.*

Circle No. 23 on Readers' Service Card



Turbo Pump

The latest addition to the Coffin line of steam-turbo pumps is announced. Known as Type-IND, it is designed for general industrial boiler feed or any other pumping service, requiring medium volume and high pressure.

Complete with all controls for either constant or differential pressure regulation, the pump has a simple, single-stage design with turbine, pump and control located in one integral matched unit. All pumps are precision built for high-speed operation at minimum steam consumption. Its capacities are 180 gpm. with discharge pressures to 350 psig. *Coffin Turbo Pump Co., Food Machinery & Chemical Corp.*

Circle No. 24 on Readers' Service Card

Dynamically-balanced plugs

New dynamically-balanced Emerson Jordan plugs are now available. They are said to reduce vibration, lower maintenance costs, increase tackle and bearing life and improve stock quality.

WORLD WIDE PULPSTONE SERVICE!

Behind the world-wide acceptance of Norton pulpstones is a world-wide service organization of Norton pulpstone engineers — a group of men qualified by practical paper mill experience to study your mill and to make specific recommendations based on your type of wood, your kind of grinders and the type of pulp you want to produce.

No matter where your mill is located, there's a Norton pulpstone engineer within reach. He will be glad to specify the correct pulpstone to meet your particular requirements and to render technical service.

Hundreds of pulpstones are shipped each year from the Norton plant at Worcester and from Norton Company of Canada's plant at Hamilton, Ontario. Each has been carefully engineered to meet the special requirements of individual mills in all parts of the world.

Making better products . . . to make your products better

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Norton Company of Canada Ltd., Hamilton, Ont.
EXPORT: Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

NORTON PULPSTONES

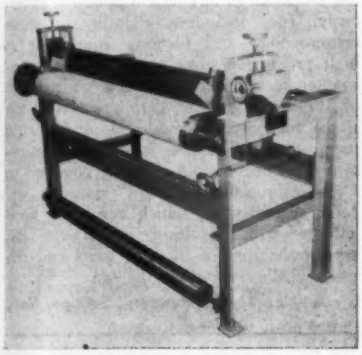
Abrasives - Grinding Wheels - Grinding and Lapping Machines Refractories - Electrochemicals - Non-slip Floors | Norbide Products

New Products . . .

Dynamic balancing measures the vibration caused by centrifugal force and locates any points of unbalance in the plug as it is rotated at the exact rpm it is to be mill-operated. Unbalance is then corrected.

Emerson plug dynamic balancing replaces obsolete static balancing. Provided as a quality control measure on all plugs, dynamic balancing is standard practice at the company, even on the largest sizes ranging over 5000 lbs. *Emerson Mfg. Co. Div., John W. Bolton & Sons Inc.*

Circle No. 25 on Readers' Service Card



Knife-over-blanket coater

A new knife-over-blanket coater for coating paper and fabrics has been developed. It is said to offer versatility in blade adjustment and blade pressure. This new unit rounds out the company's complete line of coating machinery for the converting industry. *Dilts Div., Black-Clawson Co.*

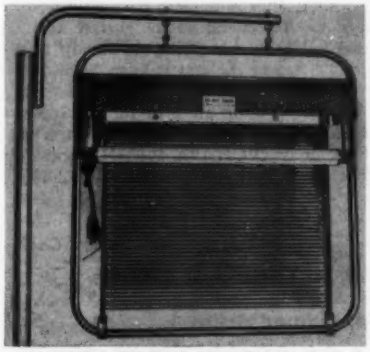
Circle No. 26 on Readers' Service Card

Steel strapping stretcher

A new improved steel strapping stretcher, used for bundling round products, flat products and many other narrow-surfaced, non-compressible products with heavy-duty ¾-in. or 1¼-in. steel strappings, is now on the market.

Known as Signode Model PH-2 Stretcher, this tool has been improved over the Model PH-1 in three ways: The stretcher handle is longer so that greater tension can be applied to the tool with the same amount of effort; the handle, frame, nose and other parts of the tool have been considerably strengthened to give the tool greater durability and holding power; and the break-off nose is of improved design resulting in an easier and cleaner breaking of the strap. *Signode Steel Strapping Co.*

Circle No. 27 on Readers' Service Card



Electric insect destroyer

A new, automatic, electric-insect destroyer has been made available. It is designed to attack and destory most night-flying insects. It can be used for paper and pulp mills, processing plants, etc.

The electric insect destroyer is portable, safe and non-chemical. It is made of modern, light and attractive materials, all of rugged weather-proof construction.

The unit is complete with a Blacklight lamp (giving off a pale blue light) and a three-wire cord set with an adapter and a mounting bracket. The post is not included. It can be plugged into a 115-V, 60-cycle, ac-power source. For foreign use, special voltages and cycles are available. Overall size is 28 sq. in. *Electro-Lads Mfg. Co.*

Circle No. 28 on Readers' Service Card

Machine for cleaning and de-scaling

A new machine for cleaning, de-scaling and de-rusting has been introduced into this country from Switzerland. Known as the VONARX-PISTOL, it operates on

EVERY TYPE OF CUT GEAR FOR EVERY INDUSTRIAL PURPOSE

SINCE 1888 . . . We have been making many types and sizes of gears for industry. During these passing years we have derived considerable experience, trained numerous personnel, and expanded our mechanical and plant facilities—and have remained under one continuous management. We are ready to ably serve you.

ESTABLISHED 1888
D.O.James

D. O. JAMES GEAR MANUFACTURING CO.
1140 W. Monroe Street, Chicago 7, Ill.

PRIVATE EYES

Jenkins' METLKOR brushes, teamed with Viking's Void Detector, check every inch of paper as it is made, find holes, measure them, count them, record them, pinpoint their positions and signal the operator, all automatically. The Jenkins' feeler brush, a critical part of the system, sends a low voltage pulse to the Viking Indicator Unit whenever a hole appears.

John Glump, Vice-President of Viking Instruments, Inc., of East Haddam, Conn., says: "Jenkins' brushes do a superb job for us. They are an improvement on 13 counts:

1. Improve accuracy of flaw detection.
2. Have no abrasive effect on product.
3. Eliminate lint problem.
4. Outlast previous brushes 3 to 1.
5. Made exactly to size, no cutting or alterations necessary.
6. Simplified mounting.
7. Improved construction.
8. Superior bristles.
9. Refillable when bristle is worn.
10. More economical.
11. Free engineering service.
12. Speedy solution to problem.
13. Quick delivery."

Jenkins' METLKOR Paper Polishing Brush

Jenkins' also makes the following brushes for the paper industry:

Conveyor Cleaning • Blanket Washer • Fourdrinier Wire Cleaning • Polishing • Coating • Dusting • Dampening • Spray • Sieve • Static Elimination • Flocking • Felt Cleaning • Feed or Carrier • Paint Brushes • Floor Sweeps

Specify Jenkins' METLKOR
the original . . . the best Metal Core brush

METLKOR®
CYLINDER BRUSHES
and LIFEWOOD® WOOD BACKED BRUSHES

M. W. JENKINS' SONS, INC.
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New Products . . .

compressed air from any industrial-type of compressor. The action produced by this machine is a spring-loaded recoil movement of hardened steel needles or non-sparking brillium needles. The air continues on from the pistol to blow any particles off the working surface, without causing them to fly around.

Each needle operates independently from the other, thus allowing the needles to adjust to the contour of the surface being cleaned. Needle life is approximately 200 to 400 hrs. and the cost is from 7c to 10c per hr.

Normal working air pressure is 88 psi. and the air consumption is 12½ cfm. The weight of the VONARX PISTOL varies—Model II-B, 5½ lbs.; Model III-B, 8½ lbs.; and Model IV-B, 13 lbs. *Swissair Tool Corp.*

Circle No. 29 on Readers' Service Card

Copolymer resin

A new carboxylated polyvinyl-acetate copolymer resin is now on the market. Designated as GELVA M-7 V-100R, the new resin reportedly has a higher degree of carboxylation than standard polyvinyl-acetate copolymer resins.

The new resin also offers enhanced heat resistance, higher solution and melt viscosities. It is suggested primarily for use in formulating paper adhesives. *Shawinigan Resins Corp.*

Circle No. 30 on Readers' Service Card

Multi-purpose resin adhesive

A low-viscosity, multi-purpose, polyvinyl acetate resin adhesive called the Solu-Rez series has been developed. The new resin adhesive, originally developed for use in carton sealing and forming operations, can now be used for other types of packaging and paper converting such as tube winding, folding-box manufacture, multi-wall bag sealing, etc.

It now combines a number of advantages, not available in any single adhesive previously. They include: Suitability on most carton-sealing and forming equipment at high production—line speeds normally encountered; strong bonds on a wide range of different types of carton surfaces; no significant viscosity build-up under constant agitation (up to a week); elimination of non-reversible skinning common to PVAc-resin adhesives; low viscosity and good spreadability, which result in good mileage with resulting economies; and easy washability of machine parts and reservoirs. *Morningstar-Paisley Inc.*

Circle No. 31 on Readers' Service Card

Materials-handling system

A new materials-handling system tradenamed Dempster-Dinosaur is announced. It uses giant containers of up to 40-cu. yd. capacity and over. The system consists of a truck-mounted Dempster-Dinosaur and any necessary number of detachable containers.

As each container is filled, the Dinosaur mechanically picks it up, hauls it to its destination, then either puts it down or dumps its contents. Only the driver is required to operate the system and he never has to leave his truck.

Basic advantages are: larger containers; better weight distribution; legal load limits of up to 30,000 lbs and complete hydraulic operation.

The new Dempster Dinosaur can be used for such operations as refuse disposal, scrap collection, cargo handling and bulk-materials handling. *Dempster Bros.*

Circle No. 32 on Readers' Service Card

NEW LITERATURE

Books

KAISER ALUMINUM FOIL. Prepared by the Technical Publications Dept. of Kaiser Aluminum & Chemical Sales Inc., 919 N. Michigan Ave., Chicago 11. Pages: 244. Price: Free, if requested on company letterhead; otherwise, $12.50 for each personal copy.

The new 8½-x 11-in. book discusses new foil products and efficient production methods for traditional items. More than 350 photos and drawings are included.

The first four chapters present a panorama of end uses, techniques for designing foil surfaces, description for aluminum foil production and data properties and availability. The last six chapters describe basic converting processes and equipment used for aluminum foil.

More than 200 converting, equipment and material manufacturers contributed information for the book, written and compiled over a two-year period.

The new volume uses an experimental aluminum foil case binding to demonstrate foils' effectiveness as a unique graphic arts material in the bookbinding field.

WELDING OF PLASTICS. Written by J. A. Neumann and F. J. Bockhoff. Published by Reinhold Publishing Corp., Dept. B-286, 430 Park Ave., New York 22. Pages: 279. Price: $7.25.

This book comprehensively discusses all phases of plastic welding ranging from initial design procedures to final detailed manufacturing methods. Various physical and chemical properties of individual plastics presently used for welding construction are completely covered with regard to their use in chemical and allied processing. All presently known welding techniques are covered in detail. Many step-by-step procedures with photographs are included.

The book also contains thorough corrosion-resistance tables and a concise guide for choosing appropriate plastic construction material. A whole chapter is devoted to design considerations as they specifically affect welded construction. Testing and welding are also treated separately.

Booklets

STANDARD MATERIALS ISSUED BY THE NATIONAL BUREAU OF STANDARDS, is the title of the 27-page National Bureau of Standards Circular 552, Third Edition. This circular lists the standard materials issued by the Bureau and their prices. Information on certified compositions and properties and purchase procedures are given. Copies of this circular may be obtained by ordering from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The price is 35c for each copy. Foreign remittance must be in U. S. exchange and should include an additional one-fourth of the publication cost to cover mailing.

OUR GROWING WATER PROBLEMS is the title of a 60-page booklet, written by R. G. Lynch and published by the National Wildlife Federation. The booklet treats, on a national scale, the complex problems of managing public water resources for diverse and conflicting needs of a rapidly expanding human population The author obtained material from well-informed sources in all regions and states. Single copies of the booklet may be obtained without charge from Educational Servicing, National Wildlife Federation, 232 Carroll St., N.W., Washington 12, D. C.

USDA Reports

ELEVEN NEW OR REVISED REPORTS have been released by the U. S. Forest Products Laboratory. Publications available are: No. 454, Wood-Finishing Subjects; No. 444, Pulp and Paper; No. 704, Wood Preservation; No. 200, Mechanical Properties and Structural Uses of Wood and Wood Products; No. 2145, Summary of the 1959 Meeting of the Dimensional-Stabilization Seminar; No. 2142, Cold-Soda Pulping of Southern Oaks, Sweetgum and Cottonwood; No. 2141, Boards and Papers From Shortleaf Pine, Black Tupelo and Southern White Oak Neutral Sulfite Semichemical Pulps; No. 1757, 1959 Progress Report on Comparison of Wood Preservatives in Mississippi Post Study; No. 2144, Growth, Specific Gravity and Chemical Composition of Quaking Aspen on Different Soil Types; No. 1868, Buckling of Simply Supported Rectangular Panels Subjected to Edgewise Bending.

Single copies of these reports are available free by writing to the Director, U. S. Forest Products Laboratory, Madison 6, Wis.

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

Belt-conveyor equipment

Industrial Div., Continental Gin Co., is presenting a new catalog which deals primarily with belt-conveyor equipment. Dimensional information is given on all of the elements necessary to build a belt conveyor. This 88-page catalog, known as Engineering Data Book ID-591, contains an ample amount of photos, diagrams and data tables.

Circle No. 33 on Readers' Service Card

Air shaft reel

Nashua Industrial Machine Corp. announces the availability of a new illustrated bulletin which describes its Nim-Cor air shaft reel.

Circle No. 34 on Readers' Service Card

Suction unit

W. P. Evans & Son Ltd. is offering a bulletin describing its new suction unit, tradenamed Rotabelt. The bulletin has photos and diagrams on typical applications of the suction unit.

Circle No. 35 on Readers' Service Card

Surface-active agents

Onyx Oil & Chemical Co. announces the availability of a 24-page catalog of surface-active agents. Each product is described by trade name, active ingredient, percent activity, physical state, general use, specific applications and properties. The products are divided into three general classes—anionic, cationic and non-ionic. A two-page section explains the chemistry of each of these groups.

Circle No. 36 on Readers' Service Card

Color conversion chart

Atlas Refinery Inc. has issued a new color conversion chart. It is designed to make possible a comparison of color intensity between color systems.

Circle No. 37 on Readers' Service Card

Loading assemblies and loading valves

OPW-Jordan Corp. has released a new bulletin on how to properly select loading assemblies and loading valves. Included in the bulletin are illustrations of two popular loading assemblies and a cut-away photo of a loading valve. A full range of prices and sizes is also given.

Circle No. 38 on Readers' Service Card

Hardware for wood tanks

Arrow Tank Co. Inc. is offering an illustrated brochure which describes its line of hardware for wood tanks. It discusses tank drains, tank manholes, hoops, lugs, level indicators, gauges, tank wrenches, threaded rods and studs.

Circle No. 39 on Readers' Service Card

Secondary liquid-level indicator

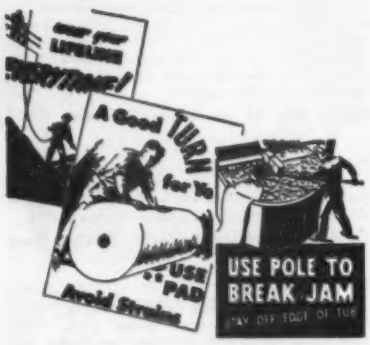
Yarnall-Waring Co. has issued a new bulletin that describes the company's new miniature, transistorized, secondary liquid-level indicator. It explains where it is used, how it operates and its advantages. Construction details, weight dimensions and an installation diagram are also included in the bulletin.

Circle No. 40 on Readers' Service Card

Non-shrink grout

Master Builders Co., in a 16-page bulletin, explains how to avoid grout shrinkage by using its Embeco non-shrink grout. It outlines and illustrates common methods of grouting different

POSTERS — A POTENT SAFETY TOOL



Posters should be one of the top aids in your safety program. No other safety medium can reach your entire audience—not once, but many times each day—with such low-cost safety messages. They are directed at the worker acts and worker attitudes that lead to accidents. Posters lend *timeliness, repetition and continuity* to your safety program . . . the three fundamental principles of direct selling.

The National Safety Council maintains a stock of posters that covers all industries, operations and phases of safety and health. These posters are produced in two sizes: "A" size, 8½"x 11½", and "B" size, 17x23". Their colorful illustrations and eye-catching captions make them ideal for the mass selling of safety.

Write for a free copy of the Directory of Occupational Safety Posters. This 72 page catalog illustrates 744 posters, indexed and classified for specific operations.

NATIONAL SAFETY COUNCIL
425 N. Michigan Ave.
Chicago 11, Illinois

New Literature . . .

types of equipment, the mixing and placing of grout and cold- and hot-weather-grouting. Information on recommended mixes, estimating tables and actual installations are also included.

Circle No. 41 on Readers' Service Card

Carbide-tipped saws

Disston Div., H. K. Porter Co. Inc. has issued a new 8-page catalog section on its line of carbide-tipped saws. This section includes a guide for selecting saws with the proper diameter, proper number of teeth and proper saw speed for a particular use, as well as helpful hints on their care and handling. Every carbide-tipped saw is also illustrated.

Circle No. 42 on Readers' Service Card

Industrial measuring instruments

Martin-Decker Corp. has published a highly illustrated, eight-page bulletin which describes its various industrial measuring instruments. Included in the bulletin are the Sensater hydraulic-crane scale, Load-cell systems, lift truck weight indicators, crane-weight indicators, special load measuring instruments and receiving instruments.

Circle No. 43 on Readers' Service Card

Cacodylic acid

Ansul Chemical Co. has released a new 14-page bulletin which discusses cacodylic (diamethylarsenic) acid, claimed to show promise as a herbicide. Among the items discussed in the bulletin are its chemical, physical and toxicological properties, and information on its various uses.

Circle No. 44 on Readers' Service Card

Vibrating-screen separators

Southwestern Engineering Co. has published a new bulletin describing it vibrating-screen separators. With a cross-section drawing of the SWE CO separator, the bulletin explains how it functions vertically, horizontally and tangentially, plus its many applications and advantages.

Circle No. 45 on Readers' Service Card

Industrial truck attachments

Elwell-Parker Electric Co.'s latest four-page folder discusses its complete line of attachments for powered industrial trucks. Thirty different attachments are illustrated and described. They are all designed for greater truck flexibility and versitality to reduce handling costs to an absolute minimum.

Circle No. 46 on Readers' Service Card

Plastic fans

Atlas Mineral Products Co. has published two new bulletins concerning its two lines of corrosion-proof rigid plastic fans made from AMPCOFLEX Type 1 polyvinyl chloride. They are said to offer exceptional chemical resistance with high structural strength in relation to weight. Bulletin 9-20 describes the centrifugal fans, ranging in size from 10½ to 35 in. and Bulletin 9-21 describes the twin-flow fans, available in sizes from 12 to 48 in.

Circle No. 47 on Readers' Service Card

Pressure instruments

Fischer & Porter Co.'s five new specification sheets describe its line of pressure instruments with corrosion-proof fiber glass cases, for indicating, recording, controlling and transmitting. Construction materials, design features, performance, operational limits, etc. are also given.

Circle No. 48 on Readers' Service Card

Machine coating

Dilts Div. of Black-Clawson Co. is offering an eight-page bulletin on the subject of new developments in paper machine coating. It describes and illustrates five categories of coaters—the Warren-Dilts air doctor method, magnetic metering bar coater, Flexiblade coater, size presses, transfer roll coaters and pilot plant coating machines. The new 3-D high-velocity dryer used in conjuction with paper and board coating machines is also shown. This bulletin also lists the coating facilities of the company's coating laboratory.

Circle No. 49 on Readers' Service Card

Dialysis system

Graver Water Conditioning Co. has announced the availability of its first bulletin that describes the new dialysis system, Hi-Sep Dialyzer, for separating, purifying and recovering acids, alkalis and neutral salt liquors. The bulletin covers design, operation, applications and advantages of using Hi-Sep Dialyzer. Comprehensive engineering drawings illustrate its construction and operation.

Circle No. 50 on Readers' Service Card

Power transmission equipment

American Pulley Co. is offering a new four-page bulletin describing its complete line of power transmission equipment. Major features of the company's speed reduction drives, screw conveyor drives, standard and wide rang adjustable speed drives, motor bases, and conveyor and split pulleys are described. The bulletin also lists complete size ranges for each piece of power transmission equipment.

Circle No. 51 on Readers' Service Card

Reference chart

Lebanon Steel Foundry has issued a new and revised reference chart containing 55 of the more widely used cast alloys in the carbon, low alloy, stainless steel, nickel and monel groups. In addition to all standard data such as composition, physicals, etc., the chart contains a new section for design applications for each steel alloy.

Circle No. 52 on Readers' Service Card

Water strainers

Glenfield & Kennedy Inc. is offering a bulletin describing its water-straining machines, tradenamed Microstrainers. The bulletin includes a description of three installations.

Circle No. 53 on Readers' Service Card

Clarifiers & thickeners

Infilco Inc. has published a new 16-page bulletin describing its three types of clarifiers and thickeners used in handling liquid-solids separation in water, sewage and industrial waste treatment. Many detailed variations in both large and small installations are also included. Three types of skimming mechanisms are mentioned, and typical low, medium and high torque drives are illustrated.

Circle No. 54 on Readers' Service Card

The Paper Industry
Professional and Business Services

J. E. SIRRINE COMPANY
ENGINEERS Since 1902
GREENVILLE, SOUTH CAROLINA

Design — Consultations
Paper & Pulp — Reports
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CLASSIFIED ADVERTISING

NEW SLIMICIDE

(tributyl tin oxide complex)

Agents wanted to handle this new slime killer priced at $2.40 per lb. Every mill who have tried this unique material are now regular users. Paper mill personnel may act as agents in spare time. Inquiries will be held confidential. Write Box 672, The Paper Industry.

WANTED

TECHNICAL DIRECTOR for pulp and paper company which will build a 500-ton per day average kraft pulp and linerboard mill to be located at Counce, Tennessee on the Tennessee River, with excellent opportunity for future growth and expansion. Among qualifications required are: College degree; 10-20 years of experience from the Southern kraft pulp and paper industry; age between 35-50; imagination and initiative; to act in advisory capacity to local officer in charge of complete operations. Position has excellent opportunities of growth in future. Only well qualified applicants will be considered. Applications will be treated confidential.

TENNESSEE RIVER PULP & PAPER COMPANY
230 Park Avenue, New York 17, New York

SELLING OPPORTUNITY AVAILABLE

Paper mill slime control chemicals available for territories in United States and Canada on commission basis. Large or small territories will be considered. Box 678, The Paper Industry.

COATING AND COLOR MAN WANTED

Experienced coating and color man with technical background for a bleached kraft food board mill. Excellent opportunities, salary and benefits. Please send resume including education, experience and salary requirements. Write Personnel Manager, American Box Board Co., Filer City, Michigan.

FOR SALE VERY REASONABLE

Three Ply Reliance Brand Leather Drive Belt 45" width x 109' long, excellent shape due to only five years service. Subject to inspection at our plant Oshkosh, Wisconsin.

MORGAN COMPANY

Eight Publications for Papermakers

Pulp and Paper, Volume 1 (Casey)	$18.00
Pulp and Paper, Volume 11 (Casey)	18.00
Paper and Paperboard Making (Williamson)	6.00
Technology of Paper Coating	2.00
Lessons in Papermaking—Part 1	1.50
Lessons in Papermaking—Part 2	1.50
Notes and Observations on Beaters	1.00
Trouble on the Paper Machine	.75

Mail your order with payment to:

The PAPER INDUSTRY

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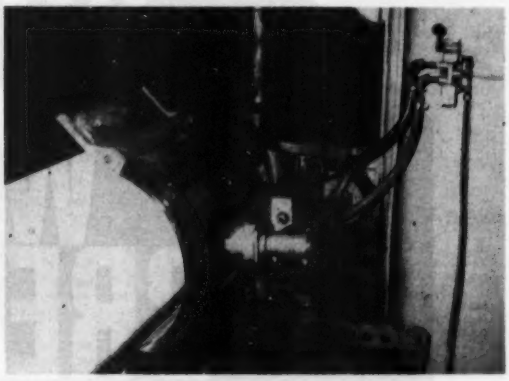
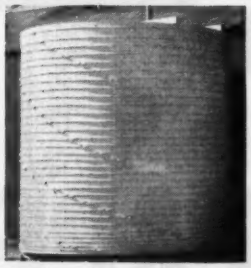


on stack at MICHIGAN CARTON CO.

"The McAfoos Starter Threader is a Safety feature and a time saver, we like it very much. As far as maintenance, we have not touched it since we put it on, about a year ago." (May 6, 1959)—J. E. Darling, M.M., MICHIGAN CARTON CO.

Contact us for all your threading equipment needs

MCAFOOS SALES & ENGINEERING CO.
Alton, Ill.



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...or small

quality-built to specifications

Kalamazoo
WOOD TANKS

Engineering experience, craftsmanship, selected top-grade tank lumber . . . your guarantee of satisfaction. For large tanks or small, see *Kalamazoo* first. Free estimates and suggestions.

WOOD TANK DIVISION

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UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
6 East 45th Street, New York 17, N.Y.

STOPS WET-END BREAKS

Curtiss-Wright **PERMAWEB***

the complete-automatic Fourdrinier system
that detects and halts wet-end breaks
-then restores the paper web to
its full width-all within
8 to 15 seconds

UPS PAPER OUTPUT

There was a time when wet-end breaks would play havoc with paper-making production—upset the entire processing cycle—pyramid production costs. No more. Now there's PermaWeb.

Have you seen PermaWeb in action? A special film, made at the first PermaWeb installation, is now ready for viewing. Call, wire or write George Butler, Manager, Industrial Controls Department, Electronics Division, Curtiss-Wright Corporation, 635 Central Avenue, Carlstadt, New Jersey and he will arrange a private showing at your mill.

The paper industry's leader in basis weight and moisture control systems

ELECTRONICS DIVISION

CURTISS-WRIGHT

CORPORATION • CARLSTADT, N. J.

*Patent applied for.

MARKET QUOTATIONS

RAGS (Domestic)

New Cotton Cuttings

The following are brokers' and large dealers' average buying prices for sizeable lots in cents per pound f.o.b. New York:

	per cwt.	
No. 1 white shirt cuttings	13.00—	13.50
Soft unbleached muslins	15.50—	16.00
Fancy shirt cuttings	4.50—	5.00
No. 1 percales	5.50—	6.00
No. 1 washables	2.25—	2.50
No. 1 light sileslas	6.50—	7.00
No. 1 light prints	4.75—	5.00
Light flannelettes	6.50—	7.00
Cottonades	2.75—	3.25
Blue overall cuttings	6.75—	7.25
Blue cheviots	6.75—	7.25
Canton flannels, bleached	10.50—	11.00
Canton flannels, unbleached	10.50—	11.00
Osnaburg cuttings	9.50—	10.50
Underwear cuts, bleached	14.50—	15.00
Underwear cuts, unbleached	14.50—	15.00
Sun tan khaki cuttings	5.00—	5.50
American linen cuttings	6.75—	7.25

Cotton Rags

The following are prices, cents per pound, paid by dealers and brokers f.o.b. New York:

	per cwt.	
No. 1 roofing (Chicago)	.90—	.95
No. 2 roofing (Chicago)	.70—	.75
Twos and blues, repacked	1.50—	1.75
Thirds and blues, repacked	1.50—	1.75
No. 1 whites, repacked	—	
No. 1 whites miscellaneous	—	
No. 2 whites, repacked	—	
No. 2 whites, miscellaneous	—	

RAGS (Foreign)

(ex dock New York City)

New Rags

	per cwt.
New dark cuttings	Nominal
New mixed cuttings	
New light sileslas	
Light flannelettes	
Unbleached cuttings	
New white cuttings	
New light oxfords	
New light prints	

Old Rags

	per cwt.
No. 1 white linens	Nominal
No. 2 white linens	
No. 3 white linens	
No. 4 white linens	
No. 1 white cottons	
No. 2 white cottons	
No. 3 white cottons	
No. 4 white cottons	
Extra light prints	
Ordinary light prints	
Medium light prints	
Dutch blue cottons	
French blue cottons	
French blue linens	
Checks and blues	
Linsey garments	
Dark cottons	
Old shepperies	

ROPE and BAGGING

F.o.b. and ex dock New York City

Sunny No. 1, domestic	—
Sunny No. 1, foreign	—
No. 1 manila rope, domestic	—
No. 1 manila rope, foreign	—
New burlap cuts (soft)	—
Sisal strings	—
Mixed strings	—

WASTE PAPER

The following are prices, dollars per net ton, paid by brokers and large dealers for carload quantities of baled stock, f.o.b. cars New York:

No. 1 hard white envelope cuttings	85.00—	95.00
No. 1 hard white shavings	70.00—	75.00
No. 1 soft white shavings	50.00—	55.00
Soft white shavings, uncoated	55.00—	65.00
Fly leaf shavings No. 1	27.50—	30.00
Fly leaf, woody, No. 1	23.00—	25.00
Mixed colored shavings	21.00—	23.00
No. 1 books and magazines	29.00—	30.00
Ledger stock, white, No. 1	50.00—	52.50
Ledger stock colored, No. 1 (Midwest ship)	30.00—	
New manila envelope cuttings (free of groundwood)	60.00—	65.00
New manila envelope cuttings (containing groundwood)	50.00—	55.00
Manila tab cards	72.50—	77.50
Colored tab cards	55.00—	60.00
New northern kraft envelope cuttings	65.00—	70.00
Triple sorted kraft, 100%	35.00—	37.00
No. 1 old kraft	30.00—	
White news cuts, No. 1	55.00—	60.00
No. 1 overissue news	17.00—	19.00
Folded news, special	15.00—	16.00
Folded news, ordinary	13.00—	14.00
Old corrugated boxes	22.00—	23.00
New jute corrugated cuts	19.00—	20.00
Mill wrappers	11.00—	13.00
Boxboard cuttings	7.00—	9.00
No. 1 mixed paper	7.00—	9.00

CHEMICALS

F.o.b. New York City

Alum, ammonium		
Granular, bags, works, cwt.	4.55—	
Lump, drums, works, cwt.	5.30—	
Powdered, drums, works, cwt.	5.45—	
1-Arginine, drums, kilo	90.00—	
Blanc Fixe		
Direct process, bags, c.l., works, ton	145.00—	
L. c. l., ton	155.00—	
Bleaching Powder, drums, cwt.	—	
Casein, domestic acid precipitated		
30-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.56—	
80-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.64—	
China Clay, domestic dry-ground, airfloat, 99%		
325-mesh bags, c.l., Georgia works, ton	10.00—	12.00
300-mesh bags, c.l., Georgia works, ton	13.50—	14.50
Imported, white, lump, bulk, c. l., ex dock Phila, Portland, Me., gross ton	20.00—	.35.00
Chlorine, liquid		
Tanks, single units, works, freight equaled, cwt.	3.15—	
Glycerine, refined		
(CP, USP) 98%, drums c. l., delivered lb.	.29⅜—	
Litharge, commercial powdered		
Barrels, c. l., works, freight equaled lb.	.13¼—	
Rosin, gum, c. l., f.o.b. New York, cwt.		
K, M	9.75—	
N	9.80—	
WG	9.85—	
WW	10.40—	
Rosin, wood, c. l., f.o.b., shipping point, cwt.		
K, M.	8.50—	
N	8.70—	
WG	8.90—	
WW	9.20—	
Saltcake, domestic, bulk works, 100% Na_2SO_4 basis ton	28.00—	
Soda Ash		
Dense, 58%, paper bags, c.l. works, cwt	1.90—	
Light, 58%, paper bags, c.l. works, cwt	1.85—	
Soda, caustic		
Flake, 76%, drums, c. l. works, freight equalled, cwt	5.20—	
Solid, 76%, drums, c. l. works, cwt.	4.80—	
Sodium Silicate		
40°Be, 1:3.2, turbid, drums, c. l., works, cwt.	1.55—	
52°Be, turbid, 1:2.4, drums, c. l., works, cwt.	2.65—	
Starch		
Pearl, 140-lb. bags, cwt.	7.51—	
Pearl, 100-lb. bags, cwt.	7.36—	
Powdered, 100-lb. paper bags, cwt.	7.48—	
Sulfur, crude		
Bulk, c. l. mine, contract, long ton	23.50—	
Talc		
Domestic, fibrous, N. V., grd., bags, c. l. works, ton	28.00—	
Canadian, ground, bags, c. l. works, ton	20.00—	35.00
Titanium Pigment		
Calcium-rutile base, regular, bags, c. l., lb.	.09⅜—	
High-tinting, drums, c. l., lb.	.14⅜—	
Zinc Oxide Pigment, American process		
Lead-free, bags, c. l. freight allowed, lb.	.14½—	
Leaded, 35%, bags, c. l., freight allowed, lb.	.15½—	

WOOD PULP

Quotations on domestic and Canadian pulp, dollars per short air-dry ton delivered consuming mills including basic allowances, follow:

Bleached sulfite, No. 1	155.00—
Bleached sulfite, Canadian	155.00—
Unbleached sulfite	135.00—
Unbleached sulfite, Canadian	135.00—
Bleached soda	150.00—
Bleached soda, Canadian	150.00—
Kraft, bleached hardwood	152.00—
Kraft, bleached	157.00—
Kraft, bleached southern	160.00—
Kraft, bleached Canadian	160.00—162.50
Kraft, unbleached southern	120.00—
Kraft, unbleached, Far West	125.00—
Kraft, unbleached Canadian eastern	135.00—
Kraft, unbleached Canadian western	120.00—125.00
Kraft, semi-bleached southern	140.00—
Sulfite screenings	—
Sulfate screenings	—

Quotations on imported wood pulp, dollars per short air-dry ton on dock American Atlantic ports, follow:

Bleached sulfite, Swedish, freight allowed	155.00—
Bleached sulfite, Norwegian, del'd with limited freight allowance	155.00—
Bleached sulfite, Finnish, freight allowed	155.00—
Unbleached sulfite, Swedish, freight allowed	135.00—
Unbleached sulfite, Finnish, freight allowed	135.00—
Kraft, unbleached, Swedish, freight allowed	125.00—
Kraft, unbleached, Finnish, freight allowed	125.00—
Kraft, bleached, Swedish, on dock	157.50—162.50
Kraft, bleached, Norwegian	155.00—

PAPER

Quotations are mill quotations Chicago

Boards (prices per ton, delivered in Chicago, 10 tons or more):	
Plain chip	107.50
News vat lined chip	110.00
.009 chip, rolls	100.00
Filled news	111.50
Solid news	114.50
White vat lined chip	144.50
Chip tube and can stock	112.50
Single manila lined chip	162.50
Single jute lined chip	147.50
Container, 42-lb.	
Kraft liner (per 1000 sq. ft.)	2.68
White patent coated	
.020	175.00
.018	177.50
.016	182.50

Book Paper (f.o.b. Chicago, c.l. cases per cwt):		
No. 1 enamels		20.55
No. 2 enamels		19.55
Machine-coated, 45- to 100-lb.	15.55—	19.00
60-lb. + uncoated offset, 25 × 38 (2000 lb.)		22.25
"A" grade English finish untrimmed, 25 × 38 (2000 lb.)		21.10

Rag Content Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):	per cwt
100% rag	—
75% "	—
50% "	—
25% "	—

Rag Content Ledger (white, 5000 to 10,000 lb., ream sealed cartons):	
100% rag	—
75% "	—
50% "	—
25% "	—

Sulfite Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):	
No. 1	—
No. 2	—
No. 4	—

Sulfite Ledger (white, 5000 to 10,000-lb., ream sealed cartons):	
No. 1	—
No. 2	—
No. 4	—

Newsprint (contract base price)	per ton
Rolls, standard	135.00
Sheets	Standard differentials

Kraft Wrapping — Natural (standard rolls 9- and 15-in. diam.)	per cwt
70-lb. and heavier	8.50
60-lb.	8.75
50-lb.	9.00
40-lb.	9.25
35-lb.	9.75
30-lb.	10.50
25-lb.	11.25
20-lb.	12.25

No. 1 Kraft Butcher — Pink	per cwt
40-lb. only	10.00

(Sheets — Plus 50c cwt)

JAGENBERG

JAGENBERG Synchro-Fly Cutter Model 'DQSM GI' in a German mill, with hydraulic stack equalizing device and slat type conveyor, designed for continuous operation from 80" diameter rolls.

Introducing a new principle, well tried and proven abroad

The JAGENBERG Synchro-Fly® Sheeter

- handling toughest board up to a basis weight of 1,850 Lbs/3,000 sq. ft., or caliper .150 (single web) with unrivalled accuracy,
- ensuring clean cut and right angled edges free from fluff and ridging even on high calipers.
- In connection with board machines, JAGENBERG's Single and Duplex Cutters provide for changing both slitter and cutter sizes during full operation; deflector for defective sheets, minimum waste.
- When used as a separate cutter (off the machine), continuous operation can be provided with the aid of brake generators, automatic web tension and edge controls, automatic web feed during roll changes.
- Automatic sheet squaring.
- All driving components enclosed in oil bath gear boxes in the side frames.
- Due to genuine shear cutting action, fly knives stay sharp for up to 3 years without regrinding.

These and more outstanding advantages are offered by the JAGENBERG Synchro-Fly.

® JAGENBERG trade mark for two rotary fly knives synchronized with web speed during the cut.

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News of the Industry . . .

(Continued from page 200)

formed by Rust Engineering Co. and is expected to be completed in early 1960.

Weyerhaeuser Timber Co. is using a new method of clarifying water in removing bark from logs for pulp mill and sawmill use at its Pulp Div. located in Everett, Wash. The company has installed a reservoir into which all barker water flows. A rotary scraper removes fibers which settle and a skimmer removes fibers which float; the material is pumped to a bank of rotary vacuum screens where water and fiber are separated.

Allied News Notes . . .

On April 15, over 200 TAPPI members attended the annual Lake States Section engineering conference in Appleton, Wis.

The day-long event featured tours through the plants of firms—whose combined business history adds up to more than two centuries—they were: **Appleton Machine Co.** (75 years), **Appleton Woolen Mills** (78 years) and **Valley Iron Works Co.** (59 years).

Stickle Steam Specialties Co. has announced that all departments of the factory and office will be shut down for the company's annual vacation beginning June 20. Work will be resumed on Monday, July 6.

Adell Chemical Co., makers of Lestoil, has announced the firm's 25th anniversary. The firm is also celebrating the completion of a new 90,000-sq.-ft. addition to its plant. With this second addition, the firm has a total of 150,000 sq. ft. of plant and office space.

Huyck Felt Co. of Rensselaer, N. Y., recently held the 26th in its continuing series of Feld Forums at Berkeley, Calif. Approximately 50 papermakers, representing mills in San Francisco area, were on hand to hear several informative talks on application of papermakers' felts.

J. O. Ross Engineering Div. of Midland-Ross Corp. has opened its new headquarters at 730 Third Ave., New York 17.

Solvay Process Div. of Allied Chemical Corp. has just completed a major modernization of its technical service pulp and paper laboratory located at Syracuse, N. Y. These facilities are maintained by Solvay as a service to the pulp and paper industry in carrying out extensive research and development work on pulping and bleaching.

Extensive adhesive research and development facilities has been announced by **Stein, Hall & Co. Inc.** Installation of a paper gumming, coating and laminating machine has been made at the company's Long Island City laboratories.

Electronic Processes Corp. of California will market its electronic temperature controls and heaters for food packaging machinery and equipment through the **Western-Waxide Div. of Crown Zellerbach Corp.** They will be manufactured in the San Francisco plant of Electronic Processes Corp. and will be marketed through all Western-Waxide sales offices.

Kohler coating method

A new coater which is said to have no speed limitations has been installed at the Abitibi Power & Paper Co. mill in Georgetown, Ontario. The coater has no rolls or moving parts. It coats paper by direct contact with the coating color in a pond, the coating being metered and smoothed by a rigid blade comprising the leaving boundary of the pond. The sheet of paper is held against the rigid blade by an air jet impinging on the back side of the web. The variable force of the impinging jet (1-4 lb. pressure) as well as the thickness of the rigid blade regulate the weight of the applied coating. The pond is equipped with a ripple bottom to prevent skip coating.

Animal bone glues as coating adhesives

Improved glue quality and new formulating techniques have revived the use of animal bone glues as a coating adhesive, according to a report from Darling & Co., who has just completed a full-scale paper mill trial using animal bone glues as an adhesive. The results show that this adhesive, which can be insolubilized, was used successfully in coating offset paper on an air-knife coater. The coated paper showed improved characteristics — notably higher gloss, higher pick, and better ink holdout. The coated paper can be printed on multi-color, high speed, offset presses.

The relatively low cost and ready availability of animal bone glue offer considerable economic advantages to the paper coater.

Pipe lines for chip transportation

An 8-inch pipeline is now being tested to transport wood chips 50-100 miles from the forest to mill sites. While it would seem possible to supply a good-sized paper mill with all the chips it needs through a pipeline system, it still remains to be established whether this can be done at a saving over traditional methods.

Coating color flow properties modified with amines

The addition of small quantities of some polyamines, e. g. ethylenediamine or diethylenetriamine, to clay-water slurries produces a high dilantant effect. This effect is explained by the theory that the amines cause the individual clay particles to join together, edge-to-edge, resulting in an effective increase in diameter to thickness ratio.

According to A. W. Claxton, Minerals & Chemicals Corp., papers coated with colors containing amines show a significantly higher gloss, easier finishing, and smoother printing surface.

De-inking plant sludge for light weight bricks

Experiments are now under way at the Ceramics Dept., University of Washington, to test the use of de-inking plant sludge in the manufacture of light weight bricks. The research is sponsored by Simpson Paper Co. and Lowell Brick Co., following some highly encouraging preliminary results.

Keep them on the

PROFIT SIDE

of the wire . . .

A significant increase in percentage of filler retained—**that's the DOLLAR-SAVING experience of more and more mills as a direct result of using a DARLING glue solution as a wet end additive.**

We'd like to work with you in determining what can be accomplished in your mill. The entire cost is on us, so you've nothing to lose—everything to gain. You can make arrangements through your DARLING sales representative. Or write or call us direct.

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GLUE DIVISION
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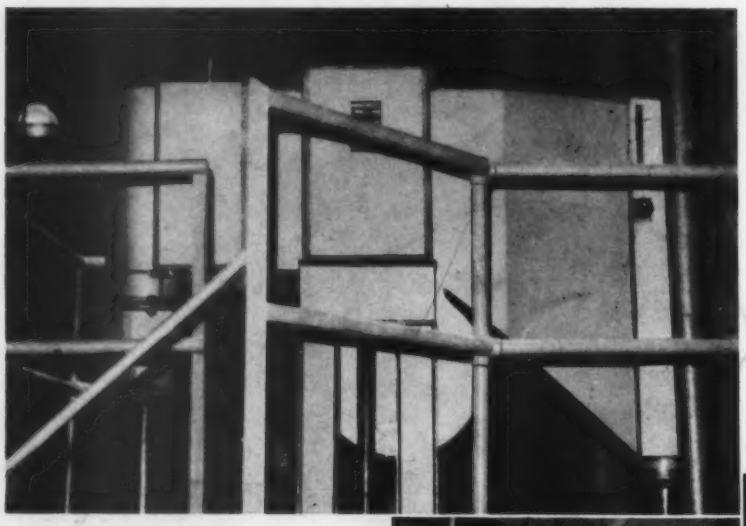
DARLING'S improved BONE GLUE

WANT COMPLETE STOCK REGULATION?

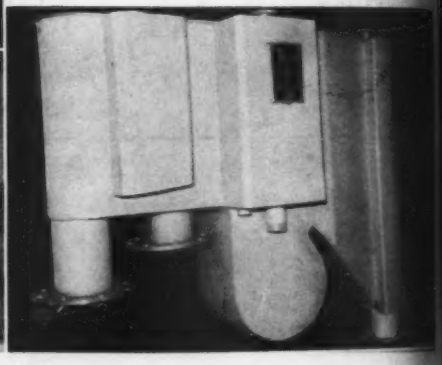
POIRIER COUNTERFLOW CONSISTENCY & BASIS WEIGHT REGULATOR



it regulates VOLUME of stock discharged to maintain BASIS WEIGHT TO WITHIN 2% plus or minus even when stock becomes too light to be controlled by dilution.

THIS MEANS! Incoming consistency can fall below control setting yet the regulator will automatically put on stock to maintain basis weight.

More yardage per run because light chest can be worked off practically down to the last drop.



Volumetric correction means getting on weight fast and holding basis in the face of consistency variation.
After shut-downs no adjustment required, even where chest consistency has varied. The regulator automatically discharges the correct net amount of fiber at the new consistency.

THE COUNTERFLOW IS THE ONLY REGULATOR TRULY MAINTENANCE FREE AND INDEPENDENT OF OUTSIDE ATTACHMENTS - FREE FROM ALL MOVING PARTS - INTRICATE LINKAGES AND MOTORIZED MECHANISMS.

CONSISTENCY controlled to within .1% through the use of the Poirier Equilibrium patent — eliminating conventional dilution valves — providing instantaneous, precise correction at stock discharge.

VOLUMETRIC CORRECTION without moving parts through the Poirier patented Multi-Stuff Gate.

THE COUNTERFLOW is used on all regulating problems from the blow pit to the paper machine — Fourdrinier or Cylinder.

Available with 24 hour recording chart — remote controlled stuff gate.

For complete details on how POIRIER GUARANTEED INSTALLATION will solve your stock controlling problems, write to

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